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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society at Calcutta It will languish if such communications shall be long intermitted; and it will die away if they shall entirely cease."—Sir Wm. Jones.

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No. II.—1851.

Observations on the Physiology of the Arabic Language. By A. Sprenger, *Secretary Asiatic Society of Bengal.*

The grammar of a language inasmuch as it teaches us of what parts its body (i. e. words and phrases) is composed may fitly be compared with anatomy. The analogy may be carried farther and an enquiry into the genius of a language, which is the living and productive principle of the development of these parts, may be called its physiology.

The Shemitic idioms, of which Arabic is the prototype, have the following very striking peculiarities.

1. Save a few exceptions they have no compound words or forms of words.* In the Hindu-germanic dialects, and more particularly in the Tatar languages, not only derivatives but even the moods, tenses, numbers, &c., are frequently expressed by compounding: thus *fuerant* is plainly composed of fu (in Persian bú-dan) and *erant;* lovely (German, lieb-lich) is composed of love and like (German, gleich); the Hindustani word karúngá کرونگا "I shall do" is composed of kar, do, un which means I, and gá, i. e. go or shall, and it answers to the

* I do not consider forms like ma-ktúb written (German ge-schrieben;) ma-ktab place of writing or school; ta-qarrub nor even mota-qarrib as compositions but as an expansion of the root to be explained hereafter. But tu-fyt thou passest is undoubtedly compound. It also appears to me that the 10th form of verbs is compound as ist-i-ghfár to *wish* or beg for pardon. Iste-mek means in the Tatar languages to desire. Should there be a connexion between this verb and the ist; which is prefixed to Arabic Verbs in the 10th form?

French *je vais faire;* funnel is composed of *fun-dere* and al, an instrument; chisel of scindere and al.*

2. Instead of forming grammatical forms and derivatives by composition the Shemites change the vowels of the words (or roots) as

Aorist Active, *ta-qúl*=sprich-st.
Past active, *qol-ta*=sprach-st.
Imperative, *qol*=sprich.
Aorist Passive, *to-qúl*=
Past passive, *qil-tá* (qyl)= } ge-sproch-en.
Subjunctive, *ta-qol*=spræch'.
Substantive Sing. *qawl*=Spruch.
Nom. actionis *qyl*=sprech-en.

I have added the meaning in German in order to show that the Hindu-germanic languages use to some extent the same means for forming derivatives and tenses. To a more limited extent such formations also occur in English; for instance, sing, sung, sang, song. In our languages however, this is the case only in irregular verbs, but as irregularities are to be considered as the remnants of a former period of a language we may conclude that the Hindu-germanic and Shemitic tongues did at one time agree in this peculiarity; but they went in opposite directions in their farther development.

It is interesting to observe that there is no instance of change of vowels except for the sake of euphony in the Tatar languages. They are therefore just the opposite of the Shemitic dialects, whereas the Hindu-germanic dialects stand between these two extremes and partake of the peculiarities of both.†

3. In Arabic one derivative is very seldom formed from another, but from the root itself. Thus the plural of nouns is not formed from

* Words of this form are very frequent in German as line-al, a ruler or instrument for making lines; Schlüssel, a key, from schliessen to shut; Sessel a chair, from to sit; Bick-el pick-axe (Hindee, kod-al or kod-ali, from khod-ná to dig.) As it was the genius of the language to give to names of instruments the termination el, this syllable has been added to foreign words which already meant an instrument; as Orgel an organ. Alah ٱلٓ plural ál means an instrument in Arabic.

† The euphonic rule in Tatar is that if the root has an i or a vowel which contains a concealed i (as e=ai; ö=oi; ü=ui), the vowels of the suffixes and affixes are equally changed into vowels similarly adfected, thus they say bák-mak and sew-mek i. e. saiw-maik.

the singular but from the root. The singular kitáb, and the plural kotob rise both from the root ktb. The same is the case with the positive and comparative, as positive kabîr, comparative masculine akbar, comparative feminine kobrâ; this rule even extends to foreign names: the sound is neglected, the consonants are considered as constituting a root from which the plural is derived without reference to the form or sound of the singular, as jalâlik which is the plural of jallik (i. e. Gallic or a Gallician), batárik, singular batryk, a Patrician. We observe that in these two examples, the plurals have the same form, though the singulars widely differ.

4. Almost every word can by simple rules be reduced to a *verbal* root of three consonants. The roots of the Shemitic languages have in fact two syllables, whereas the roots of all other tongues are monosyllabic. Moreover other languages have a much greater proportion of substantive roots, than there are in Arabic.

This is the exclusive characteristic of the Shemitic tongues, and it is therefore principally this peculiarity which will be farther illustrated in this notice.

In reflecting on the bi-syllabic or rather tri-consonantal roots of the Arabic language and the cognate dialects we find that there is some thing so artificial and unnatural in them that we are inclined to consider them as a fiction of the Grammarians. Thus we are told that ibn is derived from a root, the three consonants of which are bnw بنو and which means to build; and صرد çard plural صرود çorúd, a hill-sanatarium is derived from صرد which means feeling cold keenly, &c., but on the other hand the system of tri-consonantal roots pervades all Shemitic languages and is hundreds of years older than their grammarians.

It is usually supposed that all the roots are verbs or verbal nouns but Mr. Prichard is of opinion that they express the abstract notions of the meaning of their derivatives. The former opinion is established by the fact that almost every root if pronounced with two or three fat*h*ahs is a verb.

Though the word çard صرد a hill-station is apparently derived from a verbal root it appears from an account of Mas'údy that it is a Persian term, meaning cold. The Persian kings used to spend the hot season in the hills and the cold season at Ctesiphon. The Khalifs imitated

their example and they technically applied the Persian term sard, cold; to hill-stations. It would therefore be as absurd to derive çard in its technical meaning from the verb صرد as it would be to derive the proper name of Macadam from the verb to Macadamize. In like manner the Greek word istoria, has been imported into the Arabic language and it is pronounced iṣṭár, astár اسطار and ostúra اسطورة plural asaṭyr; out of these corruptions, the Arabs took the three consonants sṭr سطر and considered them as a verbal root meaning (in the fifth form) to tell a story and to write. Again تاريخ tárykh, date, is composed of two Persian words. In this instance they again took the three consonants ء ر خ and formed a tri-consonantal root meaning to note the date. Still more arbitrary is the formation of the root نصر naççar in the meaning of making a Christian, it being derived from Nazareth through نصراني a Christian or نصاري Christians.

It is clear from these examples, which might be multiplied, that it is the genius of the Arabic language to attach the crude meaning to three consonants of a word; (if there are more, one is usually dropped, and if there are less, one or even two are added) and to attach its modifications to the vowels and servile letters of which we shall have to speak hereafter. That part of Arabic grammar which is usually called Etymology, treats therefore exclusively on the manner in which the three radical consonants are animated by vowels, or enlarged to form substantives, adjectives, verbs, tenses, &c.

After these examples we do not hesitate to consider ibn ابن son and بنو bnw to build (German bauen) as separate and distinct roots, and to repudiate the idea that in Arabic or any other language there existed first roots which were like raw ore and that of these in the course of time, words were coined. Such an opinion would be as coarse as if we were to think that trees have been cut out of wood which pre-existed. The fact is that man will naturally give to such objects or actions as have any reference to himself, as short a name as he can, as "food;" and he will express the different modifications under which they appear to him by modifying the sound of the word as "feed," "fed." We express the difference between praying and commanding, caressing and scolding, by the music of the voice: we modify the import of our words by the intonation, and as the music of the voice rests mostly upon the vowels, it was most natural that the vowel should undergo the changes

required to modify the meaning of the word. If you address the king, you pronounce the vowel in *Sire* long, in order to make the sound grave, but if you express your anger towards an inferior, you say Sir, making the best of the *r* to thunder at him. It is said that the Chinese express the different modifications of the meaning of a word solely by modifying the intonation.

As we have brought it home to the Shemites that they use very arbitrary processes to cast roots of foreign words, we are justified in supposing that many of their roots, of which we cannot as plainly as in the preceding examples demonstrate a foreign origin, have been made tri-consonantal and considered verbal, though they are derived from monosyllabic words denoting objects or actions. We call such words for the sake of distinction the elements of roots.

Supposing all languages were originally monosyllabic and therefore unorganic, there were only two ways to enlarge them and to make them organic—by composition—this is the mode which the Tatars have chosen—and by changing the vowels and by other internal modifications, as is the case in Arabic.

The former of these means of enriching their language was contrary to the genius of the Shemitic nations, and they confined themselves to the latter, but it is evident that if the internal organization was confined to changing the vowel of the original word, the number of derivatives would have been very limited. Thus of qál you can only make qal, qyl, qil, qol, qúl, qawl and qayl. If the language of the Shemites was to become sufficiently rich for their wants, other means were to be devised to increase the number of derivatives: *the elements of roots were to be enlarged*, and it is by enlarging them that the roots became bi-syllabic.

By making the roots bi-syllabic the number of derivatives which are possible is squared. If you can derive seven words from qál, you can by a mere change of vowels, derive forty-nine from qalad. But the notions of euphony of the Shemites require, that there should be a certain proportion in the quantity of the two syllables of a word. The longer the vowel of the first syllable is, the shorter is to be that of the second and vicê versâ; thus they would not say qálád قالاد nor qylyd قيليد but forms like qálid قالد, qalyd قليد &c. are euphonic. The sense for euphony, reduces the number of derivatives to such an extent that

besides making the roots bi-syllabic other devices were necessary to enrich the language with forms, tenses, they are :—

1. To add a vowel at the end of words as qiláda قلادة

2. After this vowel a euphonic t followed by a vowel is inserted if the word is joined with the following word, as qiládatu-lma'shúqa قلادة المعشوقة

3. This t becomes permanent, if the preceding vowel (which is always an a) is long, as qiládát قلادات

4. A consonant is inserted into the word, or the second consonant of the word is doubled as iqtílád اقتلاد and qallad قلد In some instances the second consonant is repeated with a vowel as dawáwyn دواوين which is the plural of the Persian word ديوان, camámis قماميص which is the plural of the Latin word comes قمص a Count.

5. A euphonic vowel is placed before the word, as istable اصطبل from the Latin word stabulum. In certain instances either m or t or both, are prefixed to the word as taqlyd تقليد, moqallad مقلد and motaqallad متقلد

After this short digression which exemplifies what we have to say, let us return to trace the means by which monosyllabic elements of roots are enlarged into bi-syllabic roots.

1. Elements of roots which had three consonants needed not to be enlarged to be shaped into roots. The three consonants are considered as the root without reference to the original vowel, and by animating these consonants by various vowels the derivatives are formed : for instance, from the root trah (Latin trahere, Arabic طرح, German tragen, English tray,) they form derivatives like tárih, taryh, tarh, &c. ; from traf (German treffen, i. e. to hit, which has traf in the Imperfect tense, English drive, Arab طرف, which means both to drive and to hit,) they make ṭarf, ṭirf, ṭaraf, aṭráf, ṭarayf, &c. In the same way they form a number of derivatives from trab, (German, traben, Arabic طرب,) tryk, (English track, Arabic طريق), trud, (Latin trudere, Arabic طرد) blaj, (German platzen, Arabic بلج) &c.

It was probably a law of euphony which led the Arabs to be so arbitrary in altering the vowels of elements of roots. They never begin a syllable with two consonants, but they place a vowel between them to render the pronunciation easier, and if a word or syllable begins with

three consonants they drop one, thus, the word stratum (Italian strada, English street), is pronounced sirát صراط We can easily imagine how by degrees the first vowel was pronounced long in such cases, and the second short and finally entirely dropped, as in the above instances. In comparing words of various dialects of the Hindu-Germanic tongues we find indeed transpositions of vowels, which have something analogous, thus we say in German trüb-en and in Latin turb-are.* But such transpositions are never used with us as a means of forming derivatives.

Elements of roots which had three consonants served as norm, such as had less than three consonants were enlarged to three in order to form prolific roots.

2. The simplest way to effect this was to double the last consonant of elements of roots, consisting of two consonants separated by a short vowel. There is, however, no vowel between the doubled consonants in the most ancient derivatives of these roots. Taking the root kad (English cut, Arabic قد) as an example, it is likely that kadd, he has cut; kodd, cut (imperative); kadda قدّة segment, are the original derivatives and that qadyd, qidád, &c., are of more modern origin. The same applies to roots like رد radd, *reddere*, بر barr, pure; غم ghamm, sorrow, (German gram.)

The Arabs are fond of doubling letters: the roots of which the second vowel is doubled, and which are called surd roots, are therefore very numerous, there are no less than 426, and there are only 1784, possible, and some of those which are possible, would be far from being euphonic.

3. If the vowel which separated the two consonants of which the element of the root consisted is long, as in bán بان to appear (Greek φαινω) or in qál (English, call; Greek, καλεω, German, gellen, hence Kehle and nightin-*gale*), the oldest forms are made by merely changing the vowel as qál, he said; qyl, it was said; qawl, speech; qol, say, (Imperative); a-qúl, I say, or shall say. It is against the spirit of the Arabic language to pronounce two vowels after each other as in coërce. In order therefore to increase the number of derivatives, a hamzah or the consonants w or y or both, are inserted wherever two vowels meet in the formation of derivatives after the norm of tri-consonantal words, as qáyil قائل *dicens*, and owing to the tendency of the language to have

* The Latin origin of this word is attested by Soyúty in his list of foreign words which occur in the Qorán.

tri-consonantal roots this hamzah or weak consonant is considered as an essential constituent of the root and occasionally used when euphony does not require it, as in aqwál اقوال "words."

The hamzah seems to be chiefly used if the two consonants of the element of the root were separated by a diphthong, for instance by oi. In reality the diphthong is resolved into two vowels or syllables and the hamzah expresses the diæresis, as baïs بئس (German bös', English bad), though the hamzah is a much stronger consonant than the w and y* the old derivatives from roots with hamzah are monosyllabic and formed by the change of vowels only, as büs بؤس evil, misery (German, Buss') ; bäs, be miserable (German, büs') ; ta-bäs تبأس or ta-büs تبؤس, thou shalt be miserable and poor. This class of roots is evidently older than the preceding. It comprehends at present 142 roots, in many of which it is optional to substitute a long vowel for the two short vowels separated by the hamzah, you may say for instance, rás راس instead of raäs رأس, ráf راف instead of raäf رأف.

4. The Arabs (like the Greeks) pronounce a pectoral aspirate called hamzah before every vowel which is not preceded by a consonant. This aspirate is particularly strong in the case of a hiatus, and therefore in some instances they put an 'ayn ع which has the same power as hamzah, but the sound is much stronger, and therefore it is a complete consónant which is never dropped, whereas the hamzah is omitted under certain circumstances. It often happens that an element of the root which had a long vowel between two consonants has been formed into

* The strength of the hamzah is in a great measure fictitious, it is frequently written owing to a whim of the Grammarians where it is not pronounced. No part of Grammar has been less understood by Arabic Grammarians than the theory of the hamzah and alif. The following are the fundamental rules: Whenever hamzah stands over an alif, the alif is perfectly superfluous, it is merely the fulcrum of the hamzah as in سأل أمر amr, saäla ; if we were to write سئل ءمر the same sound would be expressed. Besides being the fulcrum of the hamzah, the alif has only one other use—that of a circumflex accent as سار sâra ; was it not for the alif, we would read sara سر. The alif is therefore neither a vowel nor a consonant, it is no letter at all ; but the hamzah is a letter—it is the weakest consonant. If the hamzah surmounts a w or y, as in رؤوف and سائل either the w and y must be considered as mere fulcra and therefore mute,—and we must read raüf, sâïl or the hamzah is superfluous and we must read rawûf, sâyil : to write both hamzah and w or hamzah and y, is a whim of the Grammarians.

a root in various ways by inserting a hamzah, by hardening this hamzah into an ع or even into a ح or without inserting any such letter, thus بعد ba'nd and باد bád, wide; سعب sa'ab and ساب sáb to flow (sa'b means also the sap) have the same meaning and are obviously formed from the same elements. There are in all 194 roots of which the second letter is an ع; and I suppose in more than one-half or about 100 of them the 'ayn occupies the place of a long vowel.

5. The greatest liberties have been taken with elements of roots ending in a vowel which is preceded by one or two consonants as in English, go, free, (Arabic برا brá). Roots frequently in use derived from such elements are even now only nominally enlarged and remain monosyllabic as já جاء to come (probably originally identical with the Hindustani já-ná and English go), raä رأى or rá راء to see, &c. Others have been enlarged by the addition of weak consonants (i. e. ى and و) and this enlargement is in many instances only nominal, as rawá روي to flow (Greek, ῥεω). The element of this root is clearly ra, this has been enlarged into raa and the w has been inserted for the sake of euphony. In some instances a hamzah was added, and this was frequently hardened into an ع thus بدا badá, بدأ and badaä, بدع bada'a, have all the same meaning "to commence" and both برا bará, and برأ baraä, mean to produce (para-re). The ع is sometimes even hardened into the stronger sound of غ as بلغ, بلوغ bolugh from the element bla (Greek πλειος, Latin plenus, English full.)* Roots which end in weak consonants and which therefore in reality are not tri-consonantal are very numerous. 467 roots end in w, 36 in y, and 215 in hamzah; to these may be added 161 roots ending in 'ayn; in all 879 roots which is nearly one-fifth of the total of tri-consonantal roots.

The Arabic language of books or at all events of our dictionaries, contains the words of almost all dialects of Arabia, and owing to the dialectic differences we find sometimes half a dozen of roots formed of the same element with hardly any difference in the meaning. Thus from the element kum (Greek συν, Hindee سمت simat, Latin summa, and cum) the following roots have been formed قمّ qamm, كمّ kamm, جمّ jamm, ضمّ dhamm, جمل jamal, (compare *simul*,) جمع jama' and جمي jamá. Again

* The Arabs frequently put an m instead of a b, and it is probable that the root malaä ملاء to fill, is derived from the same element.

from the element fra or far (English fro', Gothic fra, German *ver*-werfen) the following roots have been formed فرق, فر, فري, (compare frac-tum), فرض, فرد and فرس. Still more fertile in roots is the element cut (Hindee کٹنا kaṫná, which means equally to cut), viz. قط qa*ṫt*, قطع qata', قطل qa*ṫ*al, قص qaçç, (Latin scissum), قصب qaçab, قضب qadhab, and قصل qaçal. Again فل fall, فلع fala', فلغ falagh, فلح fala*h*, فلخ falakh, فلج falaj, فلق falaq and ثلع thala', mean all to split. With reference to, ثلع I have to observe that it stands instead of فلع. Ibn Hisham informs us that some tribes pronounced the ث th invariably like ف and they said فُم instead of ثُم and تحنف instead of تحنث.

قال ابن هشام تقول العرب التحنث والتحنف يريدون الحنيفية فيبدلون الفاء من الثاء كما قالوا جدث وجدف ويريدون القبر قال رؤبة بن العجاج لوكان احجاري مع الاجداف يريد الاجداث قال ابن هشام وحدثني ابو عبيدة ان العرب تقول فم في موضع ثم يبدلون الفاء من الثاء

I adduce one or two more examples فكّ fakk, فق faqq, فقأ faqaä and فقح faqa*h*, فضّ fadhdh, فضح fadha*h*, فضم fadham, فصل façal, فصي façá, فص façç, mean all to disjoin, in like manner, دع da'', دعب da'ab, دأب daäb, دعت da'at, دعز da'az, دحز da*h*az, mean all to push.

It would appear that originally only weak consonants were added to the elements of roots or inserted into them with a view of enlarging them, and that they were gradually hardened or permuted with stronger ones. Thus w was gradually hardened into f or b and permuted with m. Y ى is hardened into j ج or ء h or ح *h*, خ kh; and these are farther hardened into ق q, ك k and permuted with ض dh, ص ç, ش sh, س s, ز z, ط *ṫ*, ظ tz, ث th, ف f, ت t, د d, ذ dz, and ن n.

Hamzah is hardened into ع 'ayn, and 'ayn farther into غ ghayn, ق q, ک k, and permuted with ر r, ل l. Finally these three weak letters are frequently permuted with each other.

I adduce some examples of the permutation of consonants فرص= فرض=فرس=فرز and perhaps=فرش

فسق=فسد
فضح=فصح
خلص=فلص
فاظ=فات=فاد

عوّض=فوّض

فاح=فاغ

بخص=بحز

بتّ=بد

فرع=برع

بضک=وضح=بضع

باغ=بار

We observe farther from the above examples, that the addition of a consonant is not confined to elements ending with a vowel; but sometimes a consonant is added to elements ending with a consonant, as will appear by comparing غني gahna, with can-o, فتح fatah, with pat-ct, (the roots بت batt and فتق fataq, have nearly the same meaning), فدر with fade; فم or فاه with $\phi\eta\mu\iota$, &c.

If the element begins with a vowel or a weak consonant, they not seldom with a view of enlarging it, put a hamzah or an ع or even a complete consonant before it; thus the word يد hand is used in the meaning of assistance and أيد ayad means to assist; the root derived from the same element as over, German über, is spelt عبر in Arabic that is to say an 'ayn is prefixed, and if we compare يوم yawm, day with $\eta\mu\epsilon\rho\alpha$ it would appear that the y does not form part of the element. The element á to come (Hindustani á-ná, Persian ámadan, áy) is enlarged into the following roots اوى awa, (in this root the long a has been resolved into two short ones and they have been separated by a weak consonant w for the sake of euphony) بوى bawa and باء baä, (compare the Greek $\beta\alpha\iota\nu\omega$, and Latin meo,) and فاء fá and هاء há. The element úr or ár, which means fire, (úr means in Hebrew, fire, and آر means in Arabic inflammavit,) was enlarged into فور fawr, (compare fire $\pi\upsilon\rho$) and into نار nár.

It has been observed above that weak consonants which have been added to the element in order to form a tri-consonantal root are frequently rejected in the old forms particularly in the imperative. In imitation with this rule of throwing off weak vowels, they sometimes disappear though they form part of the element of the root. Thus إ i, is the imperative of وأى waä, to vow, (Latin vo-tum), where the w forms, no doubt, part of the element.

I add a synoptical table of the tri-consonantal roots of the Arabic language which will be found convenient for comparing them among themselves and with those of other idioms. The first horizontal column contains the first consonant of a root and the first vertical column to the left the second, and where the fingers meet if you carry one finger down from the first horizontal column and the other to the right from the first vertical you find the third consonant of the root.

Notes on the Dophlás and the peculiarities of their Language. By Wm. Robinson, M. A. *Inspector of Government Schools in Assam. Forwarded by the Government of Bengal.*

That portion of the southern face of the sub-Himalayas, which, extending from 92° 50′ to about 94° north latitude,—and forming the northern boundary of the valley of Assam, from the Kuriápárá Duwár, to where the Subonshiri debouches into the plains,—is occupied by a tribe of mountaineers, usually known to the people of the valley, under the appellation of the Dophla's. This term, whatever may be its origin, is not recognized by the people to whom it is applied, except in their intercourse with the inhabitants of the plains. Ba'ngni, the term in their language to signify *a man*, is the only designation they give themselves.

During the latter days of the Ahom Suzerainty, when internal dissensions, and the growing imbecility of the government furnished opportunities for the bordering tribes to indulge in acts of rapine and lawless aggression on their low-land neighbours, the Dophlás were not slow in exacting their share of the general spoil. Several attempts were made to check their atrocities ; and on one occasion, Rájá Gourinath Sing, is said to have marched an army into their hills for the express purpose of chastising them ; when, as native historians tell us, several thousand Dophlás were taken prisoners and brought down to the plains. The Rájá, unwilling that they should pine in indolence, obliged them to dig a canal with the view of draining off the large and unwholesome morasses that still exist in Muhal Kollongpur. But, owing to the bad treatment to which the prisoners were subjected, and the unhealthiness of the season, the greater portion of them are

said to have perished, and the task assigned them remained unaccomplished.

Others of their tribe, however, nothing daunted, continued their periodical predations, and annually kidnapped large numbers of men and women, whom they consigned to perpetual slavery. The government, unable to put a stop to these atrocities, was at length compelled tacitly to submit to them, and yield to these marauders the right of imposing a black mail on all the frontier Muhals. But the exactions of the Dophlás, fell so heavily on the inhabitants of these Muhals, especially, during the period that Rájá Purander Sing held the upper portion of the valley, as to lead to the entire desertion of almost all the villages on the frontier.

On the resumption of the Rájá's territories by the British Government, active measures were taken for checking the predatory habits of the Dophlás. It was then ascertained that the chiefs inhabiting the higher ranges, had alone the prescriptive right to the black mail. Their intercourse with the plains however, had long been obstructed by their hostile neighbours of the lower ranges. But the able conduct and perseverance of the British authorities, in re-opening communications with them, and engaging them in active co-operation, compelled the allegiant clans of the petty chiefs on the frontier hills to pay due submission to the paramount authority, and to desist from all further acts of violence on the people of the plains ; while the chiefs who held the prescriptive right to the tribute were glad to enter into an agreement to receive an annual sum from the British Government in lieu of all their demands. The sum so paid since 1836-37, amounts to Co.'s Rs. 2543, which is divided among no less than two hundred and thirty-eight different chiefs.

Of the mountains, inhabited by the Dophlás, we possess no topographical information of any value. The few Asamese slaves, who from time to time contrive to effect their escape from servitude, affirm that the Dophlá villages are large and numerous, that the inhabitants keep large flocks of cattle, and are well supplied with grain. The country is thickly covered with forests, and during the winter months, the fall of snow is said to be very heavy.

The climate, generally speaking is highly healthful. The temperature, is as various as the several elevations of the ever-varied

surface; which, though nowhere troubled with excessive heat, is so by excessive moisture, generating a rank vegetation, considerably aided by a deep stratum of luxuriant soil.

The Dophlás are divided into innumerable petty clans, who maintain among themselves an oligarchical form of government, and acknowledge the authority of from two or three, to as many as thirty or forty chiefs in each clan. The influence exerted by these chiefs, seems to be mild in the extreme. The people appear to have no legal provisions whatever for the well-being and conservation of society—the enlightened end of civilized legislation—and yet exhibit among themselves in an eminent degree, that social order which is the greatest blessing and highest pride of the social state. A sort of tacit common-sense law governs them, which notwithstanding all that has been written on the inborn lawlessness of the human race, has its precepts graven on every breast. The grand principles of virtue and honour, however they may be distorted by arbitrary codes, are the same all the world over; and where these principles are concerned, the right or wrong of any action appears the same to the uncultivated as to the enlightened mind. And it is to this indwelling, this universally diffused perception of what is *just* or otherwise, that the integrity of these mountaineers in their intercourse with each other is to be attributed.

Their ideas of religion are exceedingly crude. They acknowledge the existence of one Supreme Creator and Ruler of the world, but Him they never worship, and their religious rites consist almost exclusively in the propitiation, by offerings and sacrifices, of the spirits or Genii, whom they believe to inhabit their hills. Their worship consists of invocations of protection for the people, and their crops and domestic animals,—and of thanksgivings when recent troubles are passed. Sacrifices are considered more worthy than offerings, and hogs and fowls are the animals most frequently sacrificed. Libations of fermented liquor always accompany their sacrifices, and as every sacrifice gives occasion for a feast, the people on these occasions indulge pretty freely in copious potations. The office of the priesthood, is not an indefeasible right vested in any family, nor is the profession at all exclusive. Whoever chooses to qualify himself, may become a priest, and may give up the profession whenever he sees fit. Diseases are supposed to arise entirely from preternatural agency, hence the priests are also

exorcists. They pretend also to a knowledge of divination, and when called in cases of sickness, or in times of temporal distress, consult auspices of many different kinds, but especially by the breaking of eggs, and the examination of the entrails of young chickens.

Marriages are never entered into, before the parties have attained the age of maturity, and the ceremonies performed on such occasions are but little perplexed with forms.

The dead are always buried, and that very soon after decease. The body is borne by friends and relatives in silence to the grave, and with it are deposited the war implements and cooking utensils used by the deceased, after which preparations are made for a funeral banquet.

The physiognomy of the people, exhibits generally and normally, what is commonly known as the Scythic, or what Blumenbach terms the Mongolian, type of the human family. This type, however, is in many cases much softened and modified; and where there has been any intermixture with the Arian inhabitants of the plains, it frequently passes into a near approach to the Caucasian. The usual complexion is that of a pale brown or isabelline hue, though in many cases it approaches to a much darker tint.

The ordinary dress of the Dophlás, consists of a short sleeveless shirt of thick cotton cloth, sometimes of the natural colour, but more frequently striped gaily with blue and red, and always excessively dirty. Over this is thrown a mantle of cotton or woollen cloth fastened about the throat and shoulders by means of pins, made of bamboo. The ears are always ornamented with great knobs generally made of some shell, but sometimes of horn and amber. The hair is always worn long, very neatly plaited and turned into a knot just above the forehead. The women are generally wrapt in a shapeless mantle of striped or plain cotton cloth, with its upper part tucked in tightly over the breast, and enveloping the body from the armpits to the centre of the calves. Another cloth is also thrown over the shoulders, answering the purpose of a cloak, the upper corners of which are tied into a knot sufficiently low to expose the throat which is invariably cased in a profusion of bead necklaces of all varieties of colour. The ears are loaded with huge brass or silver rings and the ear-lobes, so stretched with the weight of great metal knobs that they not unusually reach down to the shoulders. Heavy bracelets of mixed metal

are also worn on the wrists. The hair, which among the women is generally very long and black, is gathered into a knot tied just above the nape.

The arms used by the people, consist of a long sword slung by means of a piece of cane across the shoulders, a dagger worn in the girdle, and a bow and arrows.

The arts practised by the Dophlás are few and simple. Agriculture is almost the sole business of the men, and to it is added the construction and furnishing of the dwelling house; the boys look after the domestic animals, and the women, aided by the girls, are employed in all the indoor occupations, of cooking, brewing, spinning and weaving. The agricultural implements are an axe, a *Dáo* or bill-hook, and a spade. The agricultural products are rice, (the "summer rice" of the plains) wheat and barley, with a few cucurbitaceous plants, greens, edible roots, red pepper, ginger and cotton. Very little is grown beyond what is necessary for household consumption, and the surplus is bartered either with the people of the plains for agricultural implements, culinary utensils, beads, and ornaments, and cotton-cloths, or with their neighbours on the hills, for swords and woollen cloths of Thibetan manufacture. The men haft all the iron implements they purchase abroad.

Manjit forms a considerable article of the trade of the Dophlás; it grows wild in great abundance on their hills and is said to be of very superior quality.

Of learning and letters, the Dophlás are totally devoid. Their language, as well as physical attributes, give strong evidence of their connection with the affiliated sub-Himalayan races of Thibetan origin, and a comparison of the vocabulary herewith submitted, with those I had the pleasure to furnish last year, will show a very close alliance with the dialects of the Miris and Abors.

We proceed now to a brief notice of their lingual peculiarities.

Of Nouns.

Gender.—This language possesses a variety of substantive terms, sufficient to denote all that is needful in the distinction of sex among human beings. Thus,

Abó, *father.*	Ane, *mother.*
Tette, *elder brother.*	Aná, *elder sister.*

Boro, *younger brother.*	Bürmá, *younger sister.*
Niólóbó, *boy.*	Niáme, *girl.*

Sex in the inferior animals is expressed by the post-fixes Bó or Pó *male* and Ne *female*. These terms are applied only to the last syllable of the noun if it happens to be a word of more than one syllable.

		Male.	*Female.*
Bos,	Sü ;	Sü-bó,	Sü-ne.
Dog,	Ek-ki ;	Ki-bó,	Ki-ne.
Deer,	Chá-chor ;	Chor-bó,	Chor-ne.
Tiger,	Som-nyó ;	Nyó-bó,	Nyó ne.

There are a few exceptions to the above rule ; as in

Chibi, *monkey.*	Chibi-bepo,	Chibi-bene.
Saben, *goat.*	Boblá,	Bene.

Number.—There is no grammatical form to express a plural number ; the idea of plurality is generally conveyed by such terms as Páng *all,* Árok *many,* &c., added as post-fixes to the noun. When a numeral adjective is employed, the noun undergoes no variation ; *e. g.* Ekki kánag, *seven dogs,* Sü ák-ple, *six cows.*

Case.—Cases are formed entirely by post-positions, and, as may be supposed, their number may be very readily increased.

There is but one regimen or mode of declension for all nouns, nor is this in any way perplexed by refinements expressive of either gender or number.

Ou, *a house.*

Nom.	Ou, *a house.*
Gen.	Oug, *of a house.*
Dat.	Oug-bó, *to a house.*
Abl.	Oug-gám, *from a house.*
Acc.	Oum, *a house.*
Instr.	Oug-moná, *with or by a house.*
Loc.	Oug-áló, *in a house.*

Of Adjectives.

From the principle that seems to prevail in the language, of placing the adjuncts after the objects to which they are attached, the adjective generally follows the noun it serves to qualify ; thus,

Esi hárák, *cold water.*
Bángni niá, *a young man.*
Sángná átepá, *a great tree.*
Tákar kánag, *seven stars.*

Comparison is expressed by the incrementory particle Yá or Eyá. The former is annexed to adjectives ending in a vowel, but where the final letter is a consonant, the latter is invariably employed. *Example,*

Káruk, *bad.* Káruk-eyá, *worse.*

N. B.—Adjectives when taken singly almost always end in Pá, but in composition this final syllable is omitted.

Netik-pá, *new.*	Netik-eyá, *newer.*
Árok-pá, *many.*	Árok-eyá, *more.*
Álepá, *good.*	Áleyá, *better.*
Ákso-pá, *tall.*	Ákso-yá, *taller.*
Áo-pá, *high.*	Áo-yá, *higher.*

To express the *superlative* form, the word Páng *all*, is prefixed to the adjective in the comparative state. Thus:

Páng áo-yá, *highest, or higher than all.*
Páng ákso-yá, *tallest, or taller than all.*
Páng áleyá, *best, or better than all.*

Numerals.

The numerical system is emphatically decimal, and extends no further than will suffice for the enumeration of the fingers and toes.

1.	Áken.	11.	Ráng-lá-ákin.
2.	Áni.	12.	Ráng-lá-áni.
3.	Á-ám.	13.	Ráng-lá-áám.
4.	Á-pli.	14.	Ráng-lá-ápli.
5.	Áng-ó.	15.	Ráng-lá-ángó.
6.	Ák-ple.	16.	Ráng-lá-ák-ple,
7.	Kánag.	17.	Ráng-lá-kánag.
8.	Plag-nag.	18.	Ráng-lá-plag-nag.
9.	Káyó.	19.	Ráng-lá-káyó.
10.	Ráng.	20.	Ráng-cháng.

Of Pronouns.

The Personal Pronouns are,

Ngó, *I.*	Ngó-lu, *we.*
Nó, *thou.*	Nó-lu, *you.*
Má, *he or she.*	Má-lu, *they.*

In declension, they follow the same regimen as that given above for nouns substantive.

1st Person.

	Singular.		*Plural.*
Nom.	Nó, *I.*	Nom.	Ngó-lu, *we.*
Gen.	Ngóg, *of me.*	Gen.	Ngó-lug, *ours.*
Dat.	Ngóg-bó, *to me.*	Dat.	Ngó-lug-bó, *to us.*
Abl.	Ngóg-gám, *from me.*	Abl.	Ngó-lug-gám, *from us.*
Acc.	Ngóm, *me.*	Acc.	Ngó-lum, *us.*
Instr.	Ngóg-moná, *by me.*	Instr.	Ngó-lug-moná, *by us.*
Loc.	Ngóg-álo, *in me.*	Loc.	Ngó-lug-álo, *in us.*

The pronouns of the 2nd and 3rd Person are declined in the same manner.

The Demonstrative Pronouns are, Sá, and Chó, *this*, and Áóná, *that;* and the interrogative,

Hc, *who?* and Hogo, *what?*

They may be declined in the same way as the Personal Pronouns.

Of Verbs.

Verbs expressive of *being* and *possession* are very rare. Of the former class we have Dóng-pá, in the *present*, and Dóng-poná in the *past* tense. Verbs of the latter class appear to be wholly wanting.

The regimen for the conjugation of verbs exhibits great simplicity. There are but three recognized relations of time, the absolute present, the absolute past, and the simple future; but should occasion require that the time of an action be expressed with greater precision than these tenses admit of, corresponding adverbs of time are employed and usually placed before the verb.

The variations that verbs undergo, whether in mood or tense appear to be effected by the aid of auxiliaries, which may properly be termed immutable verbal fragments. Verbs undergo no change expressive of either number or person.

Indicative Mood.

The adjuncts Dó, Paná, and Bó, form the distinctive signs of the present, past, and future tenses. Dó, is in all probability a contracted form of the substantive verb Dóng, *to be.*

Paná, is often used by itself to signify, *did;* for example,

Lák moná paná, *I did it with my hand.*

Present Tense.

Singular.	*Plural.*
1. Ngó do-dó, *I am eating.*	1. Ngó-lu do-dó, *we are eating.*
2. Nó do-dó, *thou art eating.*	2. Nó-lu do-dó, *you are eating.*
3. Má do-dó, *he is eating.*	3. Má-lu dodó, *they are eating.*

Thus also;—Báng-dó, *I am carrying.* Ángue-dó, *I am going.* Táng-dó, *I am drinking.* Me-dó, *I am seeking.*

Past Tense.

Singular.	*Plural.*
1. Ngó do-paná, *I did eat.*	1. Ngó-lu do-paná, *we did eat.*
2. Nó do-paná, *thou didst eat.*	2. Nó-lu do-paná, *you did eat.*
3. Má do-paná, *he did eat.*	3. Má-lu do-paná, *they did eat.*

Báng-paná, *I did carry.* Táng-paná, *I did drink.*

Ángue-paná, *I did go.* Me-paná, *I did seek.*

Future Tense.

Singular.	*Plural.*
1. Ngó do-bó, *I will eat.*	1. Ngó-lu do-bó, *we will eat.*
2. Nó do-bó, *thou wilt eat.*	2. Nó-lu do-bó, *you will eat.*
3. Má do-bó, *he will eat.*	3. Má-lu do-bo, *they will eat.*

Báng-bó, *I will carry.* Táng-bó. I *will drink.*

Ángne-bó, *I will go.* Me-bó, *I will seek.*

The contrasted negatives to the above are formed by the addition of the particle Má. Thus:

Present. Ngó do-do-má, *I am not eating.*
Past. Ngó do-paná-má, *I did not eat.*
Future. Ngó do-bó-má, *I will not eat.*

Imperative Mood.

The only instance in which this mood exists is in the 2nd person. It is formed by the addition of Tó, to the verb. Thus: Do-tó, *eat.* Gok-tó, *call.* No-tó, *bring.* Numerous other examples of which will be found in the annexed vocabulary.

The contrasted negative is formed by the substitution of Yó, for Tó. Thus: Do-yó, *eat not.* Gok-yó, *call not.* No-yó, *bring not.* Ángne-yó, *go not.*

The Infinitive, or perhaps more correctly the Gerund, is formed by the addition of the word Tebó. Thus: Do-tebó, *to eat,* or *for the purpose of eating.* Táng-tebó, *to drink.* Báng-tebó, *to carry.* Re-tebó, *to build.*

Participles.

The participial terminations are, [*seeking.*

Present, Neyá.—Do-neyá, *eating.* Táng-neyá, *drinking.* Me-neyá,
Past, Peló.—Do-peló, *having eaten.* Táug-peló, *having drunk.*
Me-peló, *having sought.*

Potential Mood.

When *power* or *capacity,* is intended to be implied, the word Párepá, is added to the verb in the future tense.

Ngó Ángne-bó párepá, *I can go.*
Nó Do-bó párepá, *thou canst eat.*
Má Tárbó párepá, *he can run.*

Desire is expressed by the word máng-dó, which takes the same relative position when put in conjunction with another verb.

Ngó Ángne-bó máng-dó, *I wish to go.*
Má Do-bó, máng-dó, *he wishes to eat.*
Má-lu Tárbó máng-dó, *they wish to run.*

Indeclinable Particles, so necessary in most cultivated languages for connecting sentences together and giving precision to other parts of speech, are almost unknown in the language of the Dophlás.

Where the want of a conjunction can be evaded by the use of a participle, the latter is usually introduced, otherwise the parts of a sentence hang very loosely together.

Post-positive particles, such as those given in the declensions of nouns, take the place of prepositions.

Adverbs precede the verbs they serve to qualify, and in general are placed in close juxta-position to them.

Now, Kájá.	*Then*, Kájóme.
To-day, Sóló.	*To-morrow*, Árle.
Yesterday, Muro.	*In the evening*, Sorom.
Here, Sig.	*In the morning*, Sorokámbó.
Afterwards, Koyong.	*Where?* Hógólá.
What? Hógó.	*Why!* Hógó-áráng.
When? Hüdglám.	*How?* Hógó-árángná.

Short Sentences.

Nó máng-men hógó?	*My basket is in the house.*
What is your name?	Nóm ngó áksoyá.
Ngó máng-men Pürmái,	*I am taller than you,*
My name is Pürmái.	Nó muro hógólá dóng-poná,
Ngó hát-bó ángne-dó,	*Where were you yesterday?*
I am going to the market.	Ámá-be-yó,
Ngóg-bó poisá bárgo biktó,	*Do not tell an untruth.*
Give me a few pice.	No arle ángbó párépá? [*row?*
Ngó páchi oug-áló dapá,	*Will you be able to come to-mor-*

Names of Males.

Niárák.—Tápü.—Phángche.—Tákou.—Bááná.—Táyu.—Náchebá.

Names of Females.

Niyái.—Riglem.—Háráng.—Cháng-ráng.

VOCABULARY.*

English.	*Dophlá.*	Black,	Káyá.
Air,	Dori.	Blood,	Ui.
All,	Páng.	Boat,	Náu.
Anger,	Fák.	Body,	Gá.
Ant,	Tárok.	Bone,	Sólo.
Arrow,	Opok.	Bow, (n.)	Ori.
Ashes,	Táchó.	Brass,	Pitol.
Ask,	Tá-uktó.	Break,	Fediptó.
Aunt, *Pat.*	Ábó-ámá.	Broad,	Ták-tepá.
Aunt, *Mat.*	Áne-ámá.	Brother, *elder*	Tette.
Back,	Gárpó.	Brother, *younger*	Boro.
Bad,	Káruk.	Buffalo,	Mendák.
Bag.	Sáprá.	Burn,	Báát-tó.
Bamboo,	Uwü.	Bury,	Rik-tó.
Basket,	Páchi.	Call,	Gok-tó.
Beads,	Táphlong.	Cat,	Áche
Bear, (n.)	Sutum.	Catch,	Notung-tó.
Beard,	Gámíík.	Cheek,	Niogmó.
Beat,	Mó-tó.	Child,	Ángá.
Bed,	Yó-plug.	Chin,	Chokták.
Bee,	Tá-ungk.	Cloth,	Eje.
Beg,	Khóto.	Cloud,	Domüg.
Belly,	Kópó.	Cold, (adj.)	Hárákpá.
Betlenut,	Góe.	Come,	Angkubó.
Bird,	Páttá.	Cook, (v.)	Niángtó.
Bite, (v.)	Chegop-tó.	Copper,	Támá.
Bitter,	Kápá.	Crooked,	Bákung-bálung.

* This list of English words, corresponds with that appended to my "Notes on the Languages spoken by the tribes inhabiting the mountain confines of Asam," and published in the Journal of the Asiatic Society, 1849.

Crow, (n.)	Pák.	I,	Ngó.
Cry,	Kábtó.	Immediately,	Kájá.
Cut,	Pá-tó.	In,	Áráng.
Dance,	So-tó	Iron,	Rokdor.
Dark,	Kánepá.	Ivory,	Figbó.
Daughter,	Niomeká.	Kill,	Min-tó.
Day,	Sóló.	Kiss,	Mó-póp-tó.
Deaf,	Rongbepá.	Knife,	Kotári, Kámrig.
Deep,	Áránggpá.	Knee,	Lebáng.
Die,	Sig-tó.	Know,	Chinpá.
Dig,	Pá-tó.	Laugh,	Nier-tó.
Dry, (adj.)	Hugpá.	Little,	Inchángpá.
Duck,	Háns.	Lightning,	Dóórák.
Ear,	Nióróng.	Look,	Kó-tó.
Earth,	Ked-e.	Long,	Áksopá.
East,	Lengó.	Mad,	Rugdo.
Egg,	Püpü.	Man,	Bángni.
Elbow,	Lágdu.	Mat,	Uplet.
Elephant,	Háti.	Medicine,	Dáráb.
Eye,	Nyúk.	Milk,	Áchu.
Face,	Nyogmó.	Moon,	Póló,
Fall,	Hó-tó	Mother,	Áne.
Far,	Ádópá.	Mouth,	Gám.
Fat,	Átepá.	Name,	Máng-men.
Father,	Ábó.	Near,	Berá.
Fear,	Busópá.	Neck,	Láng-gúm.
Feather,	Mümük.	Nest,	Páttá-sop.
Fight,	Goblong-tó.	Night,	Sóyó.
Finger,	Lákcheng.	No,	Má.
Fire,	Ame.	Noise,	Dugdo.
Fish,	Ngai.	North,	Sáádi.
Flower,	Pung.	Nose,	Nyopom.
Foot,	Lágá.	Oil,	Tel.
Forest,	Molotum.	Old,	Niakom.
Forget,	Máng-to.		Kochokpá,(*not new.*)
Frog,	Tátok.	Open,	Kwoktó.
Fruit,	Fe.	Paddy,	Om.
Get,	Paikpá.	Place, (v.)	Pátó.
Give,	Ke-Biktó.	Plant,	Letá.
Go,	Ángne.	Plough,	Hál.
God,	O'yuk.	Pull,	Se-tó.
Gold,	Áen.	Push,	Nángtó.
Goose,	Háns.	Quarrel,	Hüg-tó.
Grass,	Sángná.	Quickly,	Mákcháng.
Great,	Átepá.	Quietly,	Chókáb.
Hair,	Dümük.	Rain,	Niódo.
Hand,	Lák.	Raise,	Há-tó·
Hard,	Larpá,	Rat,	Kóbóng.
Hate,	Áiam.	Ratan,	O'só.
Have,	Dong.	Rice, (cooked)	Ápin.
He,	Má.	Rice, (uncooked)	Om-ben.
Head,	Dómpó.	Ripe,	Mená.
Hear,	Tá-tó.	Rise,	Gorop-tó.
Hill,	Mlodi.	River,	Kümen.
Hog,	Arák.	Road,	Lámbü.
Horn,	Ráng.	Run,	Fár-to.
Horse,	Górá.	Salt,	Áló.
Hot,	Aúpá.	Sand,	Báli.
Husband,	Nióló.	See,	Ko-tó.

Seek,	Me-tó.	Sun,	Dani.
Sell,	Plok-tó.	Sword,	Sálá.
Short,	Tong-dáng-pá.	Take,	No-tó.
Sheet,	Niáptámto, Chokto.	Thunder,	Dóó-gom.
Silver,	Tángkü.	Tobacco,	Duá.
Sing,	Ruktó.	Tomorrow,	Árle.
Sister, *elder*	Ámá.	Tongue,	Ró.
Sister, *younger*	Bürmá.	Tooth,	Fig.
Sit,	Dong-tó.	Tree,	Sángná
Skin,	Chou-pen.	Village,	Go.
Sleep,	Yop-tó.	Uncle, *Pat.*	Pái.
Slowly,	Hote-hote.	Uncle, *Mat.*	Netta
Small,	Ingchangpá.	Want,	Mang-to.
Smoke, (n.)	Müküg.	War,	Góbláng.
Snake,	Tá-büg.	Water,	Esi.
Son,	Káo.	West,	Wágo.
Soul,	Jáló.	White,	Punglugpá.
Sour,	Kungná.	Wife, (one's own)	Mige.
South,	Ságádi.	(another's)	Niofáng.
Speak,	Ben-tó.	Wind,	Dorik.
Stand,	Dok-tó.	Woman,	Niemá.
Star,	Tákar.	Wood,	Usüng.
Steal,	Do-cho-tó.	Work,	Ragretá.
Stone,	Álong.	Year,	Niáng-gó.
Stop,	Dó-tó.	Yes,	U.
Strong,	Bárápá.	Young,	Niá.

Translation of some uncertain Greek legends on coins of the Indo-Scythian princes of Cabul. By H. Torrens, *Esq. B. A., V. P., and late Secretary, Asiatic Society of Bengal.*

The ardour with which the study of the numismatic treasures of Afghanistan was pursued a few years back by no few members of our Society, was easily accounted for by the extreme historical interest attaching to them. The number of the Greek Bactrian Kings, the evidence of whose existeuce and regal power was attested by any thing beyond the meagre mention of history, was up to 1824, *eight;* Bayer having first published two coins of Eucratides and Theodotus in 1738, with his *Historia Regni Græcorum Bactriani* at St. Petersburg, and Colonel Tod, having added but tweuty-six years ago with his paper in the 1st Vol. Trans. Royal Asiatic Society, the coins of Apollodotus and Menander to those of Euthydemus, Heliocles, Antimachus Theos, and Demetrius, which were all that had been discovered in Bactrian numismatology during the course of near a century. The progress into Afghanistan of the late Sir Alexauder Burnes, the discoveries of Messrs. Court, Ventura, and other French Officers in Runjeet Singh's Service, and the investigations carried ou near Cabul by Mr. Masson, and reported in this journal, opened a wide new field, aud by successive rapidly attained discoveries we becamc acquainted, not only with all the Greek Bactrian Kings, but with the names and nations of their

successors in the lands they ruled over. Professor Wilson in 1841, collected into a single work, his *Ariana Antiqua*, the results of all that had been done in the investigation of this new page in history, and with the publication of this book, the excitement and the interest of the subject seemed to pass away. Large collections of coins were, it is true, formed by officers and even by English ladies, in Afghanistan, and able numismatists such as Cunningham and Stacy continued their labours as usual; but the historical result of the new study seemed in the mind of the public to have been attained, and no one cared to exert himself in an exhausted subject. I have in my possession a letter to me from Sir Alexander Burnes, remarking on the singular apathy as to enquiry evinced by even able men during our occupation of Afghanistan, while,—such was the fatality in the only active correspondents which the Society had beyond the Indus,—Arthur Conolly, Dr. Lord, and Lieut. Pigou of the Engineers, were successively killed in action within no long time one of the other. Events took place shortly afterwards, which diverted attention from the records of the past, in those and the adjacent regions, to the study of an anxious present, and the existence of Ancient Bactria was forgotten.

The time now appears to me to be propitious for the resumption of the study of her history, not simply as regards herself but in her connection with India; and more particularly as respects later dynasties of Barbaric princes, the Indo-Parthians, the Indo-Scythian, and Sassanian monarchs, satraps, or prefects, who held sway, independently, or as tributaries to a greater power, in portions of the dismembered kingdom of the Bactrian Greeks. Provinces, some of which constituted component parts of these principalities, are now the frontier of the British Empire in the east; tranquillity and good government have succeeded the anarchy which so lately dislocated their whole system; amid the arts of peace, the local history of those lands through which successive races of mankind have from the remotest ages of the world poured themselves into the Indian Peninsula, should most certainly be diligently investigated. The study should not simply be encouraged; it should be enjoined, and public measures taken, such as would be adopted by any other European Government placed in India as is that of England, to facilitate and promote enquiry as upon a question of science. It is not enough that from the little we do know something should have been deduced, and systematically put

on record. The next step is to have the deduction critically examined, and tested by local investigation: if it still then hold good, we may either accept it as material for history, or at any rate allow it to pass current pending the appearance of further light. There is a world of work to be done along the simple frontier of Peshawur (v. Court's conjectures on the march of Alexander, Journal Asiatic Society, Bengal, July, 1836), while the whole Punjab is a rich and almost untried field for the antiquarian and numismatologist. The idea must never be entertained that where there is the darkness of apparent mystery, discovery is hopeless.

I make these few remarks, partly in the hope that they may perchance animate some able investigator to exertion, partly as not out of place with reference to the very subject of this brief paper.

It will be in the recollection of some of the readers of the Journal that much interest was excited by the appearance, on certain of the coins of Arian dynasties subsequent to the Greeks, of pure Greek words, and sometimes of Greek barbarized even to unintelligibility, in conjunction with the title of a Parthian or a Scythian prince. The immediate query in the mind of a philologist was, does this indicate the existence of a Græco-Barbaric vernacular language? Aristophanes introduces in "The Birds" a specimen of such a dialect which no doubt, like the Carthaginian of Plautus's slaves, amused a classic audience as much as Pat or Sawny do an English one. The few words the barbarian of Aristophanes utters are chiefly bad Greek, which, if the conclusion be worth any thing based on so small a fact, would lead one to infer that Greek in these dialects was predominant; and that, putting the case we come across an instance of one, the more Greek we can detect in it, the greater the likelihood that it constituted, not a sort of royal, or medal language, but the actual vernacular of the particular people who made use of it. The thoughts involuntarily wander to the mountains of Kafiristan, that mysterious country, the *Opprobrium Geographiæ Anglicæ*, with its peculiar inhabitants, the self-declared descendants of Alexander's soldiers, who speak, say all informants, a peculiar and unintelligible language. This race of men, be they what they may, have certainly taken refuge from the overflowing tide of immigration in inaccessible haunts, where to this hour they exist, rarely, if ever, quitting their own limits. The Parthian, the

Scythian and the Sassanian, the endless tribes whom the Hindoos and Persians term *Saka* and the Greeks Σκύθαι* (v. Wilson, Ar. Ant. C. III. p. 132, 4to ed.) have swept from the more accessible tracts of the lands they each in their turn sojourned in upon their way to India, the language and the race of their predecessors, after a partial adoption of the one, and an imperfect subjection of the other. It remains yet to be seen whether, safely removed from the high-way of nations, the descendants of those who were for a time tinctured with the tastes of the most civilized people of antiquity, may not be found extant, still perhaps retaining traces of the European stock they came of (v. El-

* The loose and general use of the word by the Greeks as applicable indifferently to many nations, explains many doubtful passages in Herodotus, Strabo and other writers, and is nowhere so definitely asserted as in the gossiping chronicle of the Byzantine, Johannes Tzetzes, Chiliad. XIII.

Καὶ τουτο γίνωσκε καλῶς μηδέ σε λανθανέτω,
Ὡς ἀσβασγοὶ καὶ ἀλανοὶ καὶ σάκαι τε κὰι δάκαι,
Οι ῥως κὰι σαυρομάται τὲ κὰι οἱ ιδίως σκύθαι,
Καὶ πᾶν ὁπόσον πρόσοικον ἔθνος πνοαῖς Βορέου
Κοινῶς κατονομάζονται σκύθαι, σκύθων τῇ κλήσει.

Or in English—

And this know well, and let it not be secret from thee,
That Asbasgæ, and Alans, and Sakæ too, and Dakæ,
The Rhos, and Sauromatæ also and the Scythians proper,
And every whatso nation dwelling near the blasts of Boreas,
Generally are called Scythian, by the name of Scythians.

The Dakæ are the Dadikæ of Herodotus (III. 91) the Daæ (*Ta hi a.* Remusat, Nouvelles Melanges Asiatiques. 1. 205, *apud* Wilson) classed with the Gandarii (Herod. VII. 66, *apud* Wilson) or Candaharees, allied with the Getæ, the Jats, or Játs of India, driven south with them by the Huns, the "Dacus missilibus melior sagittis" of Horace (Od. III. 6.) &c. &c. and Scythians notwithstanding! It appears difficult to comprehend however the nomad migratory masses of mankind can be traced, distinguished, or even classified; but there does seem a chance of studying the question on the frontier of India, upon which many of these tribes, or their remnants, were impelled in succession. To have ascertained their local presence at any point is important. It would be idle enough to attempt identification of the Dacians of Trajan's column with the *Ta hi a* of the Chinese.

I may add that the "Rhos" of Tzetzes are the 'Ρως of the LXX. version of Ezek. xxxviii. 2, 3. It is the name given to the *Russians* by the Byzantine writers of the tenth century. See Gesenius's Disquisition in v. רֹאשׁ. H. T.

phinstone's Cabul, also this Journal, April, 1838, on the Siah-posh Cafirs by Burnes). It will perhaps not be uninteresting, before I proceed to a further identification of the Greek language than has yet been attempted, as the adopted tongue of barbaric princes dominant in Bactria, to make as it were a vocabulary of the Greek words in use upon their coins. These, it will be seen, are partly imitations, and adoptions of titles and attributive epithets in use with their predecessors, the Greek Bactrian monarchs;—and partly, which is very curious, verbal applications of their own, sometimes in pure Greek; occasionally, as I shall show, in words misused and mis-spelled; and sometimes, in their later periods, in an unintelligible farrago of letters, which either represent a wholly barbarized dialect, or else indicate the ignorant attempts of a barbaric people to continue the fashion of using a language, the knowledge of which had died out. The philological value of these indisputable facts consists in the indication it gives us—

1. Of the existence in Bactria of a spoken dialect of the Greek current after the conquest of Alexander from the time of Theodotus, B. C. 256 to that of Pantaleon B. C. 120, (v. for dates Wilson Ar. Ant. C. IV. *passim*)—

2. Because, as the language of established monarchy and of the dominant class, it was continued on the coinage of their barbaric successors—

3. Preparing us for the occurrence of dialectic peculiarities, savouring of Greek origin in the language of unread inscriptions or even of spoken tongues with which further enquiry and investigation may make us acquainted.

The number of Bactrian monarchs whom Professor Wilson sees reason to class as of unblemished Greek descent, is eighteen. The attempt to adjust their chronological succession has been loosely tried, but there can be no doubt that many, if not most of them, were cotemporary kings of different portions of what had been Grecian Bactria. The numismatic evidence in our possession shows Theodotus* whom Professor Wilson does not reckon in the number above noted, Euthy-

* There is historic mention of a *first*, and *second*, Theodotus or Diodotus: I have in this paper only looked to numismatic evidences, which afford one king only of the name.

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demus, and Demetrius,* to have been the only purely Greek monarchs of Bactria; their title *king*, and their proper name simply, in the genitive case of the Greek, are given upon the coins as yet found, which have issued from their mint.

Eukratides, B. C. 181, (I give Bayer's and Wilson's chronology) is the first who gives signs of orientalisation, though in style of workmanship his silver tetradrachms are exquisite medallic specimens. He ceases to be simply *king* on all his coins: he becomes on some of them *great king*, and upon one,—the authority for this however is doubtful,—*king saviour*. The source of this amplified title is explained in the obverse of some only of his coins. His name as king; his title in Greek as great king; in Greek letters, are explained in the local dialect of the land he had adopted, and he appears in Pracrit as Mahárájá. We may trace on the one hand in the sparse employment of the Pracrit legend in the case of this monarch, and on the other in the singular bungling manner in which some native artist doubtless has tried his hand at the Greek characters (v. this Journal, June 1835, Pl. XXV. fig. 5), of his amplified title, signs of the fusion going on between the conquerors, and the conquered. His coins contribute to our vocabulary the word μεγαλος *great*, and perhaps σωτηρ *saviour*.

The name of Eukratides with the word μεγας occurs in conjunction with that of Heliokles, and Laodice on an unique coin procured by Dr.

* The reasons for which I identified with this king the name of a supposed Mayes, or Maius, are given in the January number of this Journal for 1840. Professor Wilson has done me the honour to state my argument (Ar. Ant. C. IV. p. 313. 4to.); which is he states, "*annihilated*" by the discovery of an undoubted king Mayes whom he places with justice among the barbaric princes of Cabul. A comparison of the pure Greek type of the Maius Demetrius coin (Ar. Ant. Plate VIII. fig. 18.) and its Greek inscription *only*, with the barbaric Mayes having a Pracrit legend, and an oriental title, "Great king of kings" (*ut supra* fig. 10, Plate VII. fig. 5,) might have satisfied the Professor that I have not in a numismatic sense endured annihilation, that my classical argument is good as applied to a classical subject, and that Maius Demetrius with his caduceus and Greek matronymic, and Mayes the barbarian, now treading on a prostrate figure, "now" sitting cross-legged on a couch "are not the same persons." *Maius*, μάιος "filius Maiæ," (Hor.) or Mercury; and Mayes, the Deus Lunus (*mao*, moon, Zend.) of a Scythic horde are easily separable.

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Lord, and described in this Journal (July, 1838, Pl. XXVII, fig. 1.) by, of course, our ever-lamented James Prinsep. Heliokles himself however, B. C. 147, adopted the title of *just*—δικαιος—as peculiar to himself, and this word, with its translation in Pracrit, obtains on almost all his coins.

Lysias, B. C. 147, called, himself *ανικητος—the unconquered,*—and translated the title on the Pracrit obverse of his coinage.

Amyntas, B. C. 135, varied the royal attributive to—*νικατωρ*—being the Doric form of *νικητωρ—conqueror:* this word again is the poetic form of *νικητηρ* or *νικητης* (v. Liddell and Scott's Lexicon. Oxon. 1843): I am careful to show the irregularity of the language for reasons to be given hereafter.

Agathokleia, of whom one coin alone has been discovered, is the only queen who figures in the Bactrian dynasties. Her epoch is uncertain. She called her coin, piously and ungrammatically, as being —*βασιλισσας θεοτροπο* (*υ*)—of *the god-turn queen:* had *τροπος* been used adjectively, it should have been necessarily in the feminine. (?) The proper word is—*θεότρεπτος*—(Aschyl. Pers. 905) *god-sent.* She is translated in Pracrit as *maharajasa* (*not ranee*) *midatasa mikasa-klayasa.*

Antimachus, B. C. 140, boldly records on his tetradrachm his own apotheosis;—he is *βασιλευς θεος—god:* on his hemi-drachm *νικηφορος —bringing victory,* translated like the *νικατωρ* of Amyntas *Jayadharasa.*

Philoxenes, B. C. 130, has the same title and translation as Lysias.

Antialkides, B. C. 135, and Archelius, B. C. 125—120, both adopt the latter title of Antimachus.

Menander, B. C. 126, who is mentioned by Strabo (Wilson *in loc.*) as having crossed the Hypanis (Sutlej) and reached the Isamis (Jumna) river, a monarch whose extensive dominions lay to the eastward of Bactria Proper, has as title *σωτηρ—saviour*—and on one coin —δικαιος.

Apollodotus, who is also mentioned in narrative history, B. C. 110, continues the title *σωτηρ*; but in one remarkable coin described and figured in this Journal (August, 1833, Pl. XIV. fig. 4. June, 1835, Pl. XXVI. fig. 4) adds to it—*και φιλοπατορος*—(in the genitive)—*and father lover:* the Pracrit legend on this coin does not contain the translation of this new affix.

Diomedes, B. C. 100, and Hermæus, B. C. 98, continue the single title—σωτηρ: and the two last of the series of true Grecian monarchs Agathokles, B. C. 135, and Pantaleon, B. C. 120, are both content with the plain monarchic prefix.

We now reach the epoch of the first barbaric princes of Bactria, of whom it is sufficient in this place to say that they were Sakæ, Sakas, or Scythians, who, being says Strabo, "Asii, Pasiani, Tokhari,* and Sakarauli," engaged the Parthians, and were ultimately forced upon Ariana to the destruction of the Greek monarchies, and thence upon India, in which their progress was arrested by the prowess of Vicramáditya, king of Avanti or Oojein B. C., 56, commonly called Sakari, 'the foe of the Sakas.' (Wilson *in loc.*) Some light is thrown upon the immigration of these hordes by the accounts of Chinese historians quoted by Messrs. De Guignes and Remusat, in addition to the information afforded by Strabo and Trogus Pompeius, of the whole of which Professor Wilson has made ample and excellent use. The chain of numismatic evidence as respects these invaders commences with the name of Eu, and Su Hermæus, according to the arrangement in the Ariana Antiqua. The coins are of barbarous execution, the Pracrit characters corrupt, the Greek very much so; the title is perhaps an exemplification of the actual manner in which the word σωτήρος—*of the saviour*—was locally pronounced in a barbarized Greek dialect, viz. with the omission of the ω.

Passing over a few coins of uncertain names on which the learned have bestowed much trouble, only, in my opinion, to prove to us that they belong to a period of great internal confusion, during which the dominant chiefs could not command the services of any educated Greek, or even any competent artificer, we arrive at the epoch of Mayes B. C. 100; a barbarian king, whose barbarian title runs—βασιλευς βασιλεων μεγαλου Μαιου—*of the king of kings, of great Mayes:* this is translated in Pracrit—*Rajadhirajasa Mahatasa Ma-a-sa.*

* These people are mentioned by Ptolemy as a powerful tribe to the north-east of Bactria (Wilkinson's An. Æg. III. c. X.) and their name is read in the Hieroglyphs of Mudeenut Aboo as opponents of the Ægyptian armies. The other names tell their own history.

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A successor who repeats the Mithridatic title—*king of kings*—was Palirisus, B. C. 80, a king apparently of limited dominion and short reign.

With the coins of this prince have been found sparingly those of Spalyrius, B. C. 75. The legend is interesting as it contains a complete phrase in correct Greek, apart from the name which is in the nominative instead of genitive case:—Σπαλυριος δικαιου αδελφου του βασιλεως. *Spalyrius (of the) just (true?) brother of the king*—instead of—'*of Spalyrius*, &c. The Pracrit is read *Alabaraputasa Dhamiasa Spalapharamasa.*

The coins of Azilise, B. C. 60, and Azes, B. C. 50, continue the same ultra-regal title.

All the above legends of barbaric kings are tolerably well written with the exception of the σ and the o, the latter of which is invariably represented by a square, but we now come to a nameless monarch who seems to have reigned, by the abundance in which his coins have been found there, in the Punjab,—who adopts new forms for several letters: he calls himself—σωτηρ μεγας βασιλευς βασιλεων—*great saviour king of kings*—and, by his mounted effigy, seems to have been a Scythian. His religion was apparently fire worship.

The Indo-Parthian dynasty of Vonones, Undopherres, and Gondophares also adopted for their coins Greek legends with a Pracrit obverse, the titles *saviour* or *king of kings.* The name Abagases has been once read—*Akaja Kubhasa* in the Pracrit as noted in this Journal (July, 1838, Pl. XXVIII. fig. 16,) and classed in connection with this dynasty; to which also Kodes or Hyrkodes must be considered to belong. His coins have a Greek legend only, and are remarkable as presenting us with an addition to our vocabulary—μακαρος—*blessed.* It is used with a word, the corrupt Greek letters of which may read *Ordeethro*, or *Ordeoro;* the root of it is evidently Zend.

"We now come," says Professor Wilson, "to a long and important series of coins, the issue of princes of well defined names and unquestioned Scythian descent," of whom "Kadphises is the earliest." The dominion of these potentates seems to have been about Cabul and Jullalabad, spreading occasionally along the Indus, and into the Punjâb. The dynasty consists, as far as is at present known, of Kadphises, or Kadaphes,—Kanerkes or Kanerkis,—Kenorano to Ooerki,—and a

certain Baraono, to whose coinage seems to have succeeded that of Ardokro, with which the use of Greek letters died out, the language as applied to numismatic legends having already all but disappeared. I cannot help being of opinion that the last name is not that of a reigning monarch but of a tutelar deity. The words Mioro or Mithro, Mao, Okro, and Ardokro on the Kanerki coins with their accompanying symbols, refer, says Professor Wilson, to the Mithraic worship favoured or introduced by that prince. There can be little, if any, doubt of the fact.

This Indo-Scythian group of potentates presents to the philologist matter of very peculiar interest. The earliest king (or kings) introduces new Greek words as descriptive of regal merit and dignity in conjunction, to a certain degree, with the old "king of kings" title, and even appears, as I read the words, to place upon his coin a familiar expression of vernacular Greek. His successor (?) alternates the Grecian form of the title above noted with its equivalent in Hindee, *Rao Nana Rao*; and continues to affix, after his name, with this title current in India to this day, the corrupt form of a Greek appellative! Later kings fall, as I have noticed, into total barbarism of language and expression.

This group of coins has afforded numismatologists much trouble, and their difficulties are epitomised by Professor Wilson in the legends, some of which I give in simple Greek characters.

1. Κορσο κοζουλο καδφιζου—Pl. XI. f. 10, Ar. Ant.
2. οσονηλνο—Pl. XI. f. 12, ditto.
3. οηυοχ φηομο—Pl. XI. f. 13, ditto.
4. ζαθου κοζολυ καδαφες κορανο—Journ. As. Soc. B. June, 1835, Pl. XXIV. and Sept. 1836, Pl. XXXV.
5. ραο νανο ραο κανηρκι κορανο—Pl. XII. fig. 3, Ar. Ant.

"It may," says the Professor, "furnish some clue to the origin of these coins, that as far as we can conjecture the purport of their legends, the title of king is wanting on the reverse of all, and also on the obverse of the coins which bear the names of Kadaphes and Kadphises. What may be the meaning of Zathou, Korano, or Korso in the Greek, it is impossible to say, or whether either (any?) of them be equivalent to king: the latter recurs in the coins of Kanerkes in a position in

which it cannot well have that signification. Neither (none?) of the others bear a resemblance to any Turkish title, as Beg or Khan. It is said indeed that the Sakas when subdued by the Yui-chi had no king: and it is elsewhere mentioned (?), that in the century before our era they had abolished royalty, and remained under the command of military chiefs; and hence possibly the adoption by them of the portraits and types of Hermæus at various times, and the insertion of names and epithets unconnected with royalty. These coins therefore might be the issues of different military officers of the Sakas, during the latter half of the century that preceded the Christian era, and the establishment of the kingdom of the Yui-chi; in which case the conjecture that these coins bear the name of the Yui-chi prince, Kiu-tsiu-kio, would fall to the ground." (v. also Ar. Ant. on the same subject pp. 358-59, 4to.)

In dealing with the difficulties above set forth, it must be recollected that we have to do with a dialectic difference, as I read it, of the Greek, which had, as we have already seen, become even in Græco-Bactrian periods, incorrect, not to say corrupt; but strange to say, it is not the less in its elements Grecian, as I shall proceed to show. Should my brief dissertation appear a little pedantic, I trust it may be excused on the ground that the subject is new and curious, and one which the savans of Europe have, by their tacit concurrence with the dicta of Professor Wilson, pronounced inexplicable.

As to the first word then, in the legend No. 1, κορσο, I must remark, with reference to those which will form the matter of our sequent enquiry, that it is intended to be in the genitive case, the legends of this period giving us ο, and even υ for the genitive ου: the nominative of this word would therefore be κορσος. The word κορση which in old Homeric Greek* (Il. 4, 502, 5, 584,) is used plurally for the temples, or sides of the head, and more modernly in a poetic sense for the head, is the root whence this barbarized substantive has been derived. There is a legitimate Greek noun κορσης (one who cuts or shaves the hair), but it springs from quite another origin (κειρω—to clear or shave). The attempt has been evidently made in the rude word before us to impersonize *the head*, as alluding to the qualifications of the individual

* Sans. çeersha: root, κάδα.

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to whom it is applied to head or lead a tribe or people. It is in fact, however irregularly, the philological equivalent of our common and popular English word, *header*.

The next difficulty in legend No. 1, is simplified by looking on the word at once as composite: there is no such, nor the semblance of such in Greek. It appears on the legends with different spellings, the second syllable being at one time vowelised with ο, at another ου. As respects this difference, I refer the reader in the first instance to the Greek dialectic differences which I have detected in the pure Græco-Bactrian period; and then remind him of the Doric (which we have already found in the coins), and Æolic permutations of ου for ω; and in the latter dialect of even ο for ω; sufficient, as critics too well know, to warrant in pure Greek literature a wearisome variety of readings. It is no stigma on our scholarship, if we explain the barbarized written form of a rude spoken (?) dialect by a reference to these varieties. I read the word as—*και οζωλου*, the *και* being abbreviated as in *κάν* for *κὰι ἄν*—*κάλον κάγαθον* for *και αγαθον*:—* the adjective being formed from ὄζος—a branch,† and metaphorically, a scion or offshoot (ὄζος ἄρηος Il. 2, 540.): its meaning therefore is that of *brancher*, *branch-giver*, or *branch-leader*. I read the legend No. 1, in English—of the header and branch-leader Kadphises.

Before quitting the subject of this legend, I may quote a very curious passage in the elder Pliny (B. 17) which bears upon the Scythic use of the word *Chorsus* or *Chorsas*, as descriptive of the heads or

* As authority for the absorption of αι in a legend vowel, I cite from a fragment of Archilochus (apud Ammonium) given as follows in De la Roviere's Greek Poets, (Ed. Colon^{æ} Allob^{m}. 1614)—

ὡς ἄρ' ἀλώπηξ τε κἀετός
ξυνωνίην ἔθεντο

M. Mure (Crit. Hist. Gr. Lit. v. III. 56,) quotes the line from Bergk's Poett. Lyrr. 487, fig. 91, thus—

ὡς ἆρ' ἀλώπηξ κἀετὸς
κ. τ. λ.

As examples, both readings favour my hypothesis too plainly to need further exposition. H. T.

† Scholars who might assign a derivation less complimentary to Kadphises, are requested to remember that *that* adjective is ὀζόλης.

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leaders of a tribe. I need hardly remark that, chronologically speaking, there would have been ample time for the adoption of the (foreign) term as a national phrase before Pliny wrote of the Scythians;—and I may mention that I believe the word, which occurs in no dictionaries (?), is not to be found elsewhere in any classic of authority. Should my Greek derivation be thought arbitrary, I have yet a meaning indigenous among the (Indo) Scythians for the first word in the legend in the passage as follows:—"Ultra sunt populi Scythorum: Persæ illos Sacas universos appellavere aproximâ gente; antiqui Arcmeos; *Sacæ ipsi Persas, Chorsaros.*"

The legend No. 2, occurs also on a coin of Kadphises, marking the commencement of the introduction of a Mithraic worship which became generally current in the time of Kanerkes, whose coins bear indifferently the Greek ἥλιος, or the Zend Græcised μιθρο. It is slightly barbarized by the omission of an ι; or perhaps rather the use of υ for ι: it reads easily.

ὅσον ἡλιοῦ—as great as the Sun.

The legend, No. 3, I introduce, not to explain it, but to give such readers as are new to this branch of study a fair specimen of the unintelligible; together with my assurance that there is infinitely more of the like found, and to be found, which patience, ingenuity, and the spread of intelligence will make patent to us; of course if labourers be found where the vineyard is so large and fruitful. The second word gives an idea of the Greek φημη.

Legend No. 4 contains the three words, one of which I have explained, which constitute the despair of the author of Ariana Antiqua. They are not the less Greek, very slightly barbarized. The use of the first however, as applied personally, argues the same corruption of language, traces of which have already met us;—ζαθος—ζαθεος—*divine, godlike, majestic;* φρυγῶν τε ζάθεοι σελᾶναι (Eurip. Troades, 1074.) being used by Homer (in the Iliad only) as also by Hesiod and Pindar as applicable to places and cities frequented by the gods, (in the same sense as ἠγαθεος in relation to ἀγαθος). Here the rude dialect applies it to the king Kadaphes, who also assumes the ὀζωλος title, and adds as his sovereign designation, the Greek word, doubtless as it was barbarously pronounced,—κοιρανος:—κοιρανου—κορανο. When Mr. Masson vaguely guessed, the word

meant "a military chief," he was right. It occurs joined with ἡγεμών (Il. 2, 487: also, Il. 7, 234, κοίρανε λαών), and joined with βασιλεύς (Il. 2, 204); but is ordinarily used as *lord* or *master*, in which sense the well known line of the Iliad, οὔκ αγαθὸν πολυκοιρανίη, ἷις κοίρανος ἔστω—gives two instances. It may be fairly taken on these authorities as "equivalent to king;" and I read No. 4, in English therefore—

*Of the divine and branch-leading Kadaphes king.**

Legend, No. 5, gives us the interesting spectacle of this pure Greek word in vernacular contact with one which still forms part of the spoken Hindee of this country—

Of the king of kings Kanerkes king (or Lord).

It is interesting as part of the speculation which represents the people over whom this dynasty ruled as being under military chiefs or

* Prof. Wilson says (Ar. Ant. p. 358-9)—"With regard to the epithet, if it be an epithet, Korano, it has already been observed that Mr. Masson considers it as denoting "chief" or "military leader" at a time when Indo-Scythians had substituted military chiefs for kings. No authority is given for the meaning, and it would be obviously incompatible with the use of the words Rao and Basileus with which Korano is associated." This assertion the Professor makes, as he tells us in the title-page, "*under the authority of the Hon. the Court of Directors of the East India Company:*" it is against that of Hesiod (Works and Days, 261) and of Homer as in the Hymn to Ceres, and of Herodotus and of Plutarch in their lives or notices of Homer (v. Mure's Critical Hist. Gr. Lit. Vol. 2, appendix F.) "The title Basileus frequently occurs in the Works and Days" says, Mr. M. "but in the plural number and evidently denoting an aristocratical magistracy acting also as judges similar to the Archons of Athens, or the Prytanes of Corinth and Corcyra." By historic analogy we thus arrive at an idea of the political character of these princes of Cabul and the Punjab who were *civil judges* (βάσιλεις) and *military leaders* (κοιρανοι) or *lords*, the feminine of which title Aristophanes uses for lady.

To put an end to all doubt as to the value of these several titles, I append Johannes Tzetzes the Grammarian's remark on an Orphic distich which he quotes in his Commentary on Lycophron's Cassandria 523, "showing the difference of these."

ἔσται δ' ἄν τις ἀνὴρ ἢ κοίρανος ἠὲ τύραννος
ἢ βασιλεὺς ὅς τῆμος ἐς οὐρανὸν ἵξεται ἀιπὺν.

(Apud Lobekii Aglaophamum, lib. II. Sec. 3.)

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lords in the Punjab, and as having abolished royalty, to detect in one of the epithets of these potentates an indication of the leader of a sect or branch: and it is curious, as history is ever a repetition of herself, to discover in this rude community the prototype of the Sikhs, divided into their ὄζοι or *Missuls*, before the dominant influence of the great and wise Runjeet had consolidated their power into the union of a monarchy.

The last observation which I have to offer respecting these coins is a conjecture as to a very peculiar legend of Kadphises in which, in a very perfect silver specimen (the only Indo-Scythian silver coin yet (1841) found), there occurs after βασιλευς βασιλεων μεγας the inexplicable word OOHMO. A similar barbarism occurs on a large copper coin of this king after the words βασιλευς βασιλεων σωτηρ μεγας written ΘΟΜΗΝ. It varies apparently on other coins to OOH, ΘΟΚ, OOHK, OOKM. Is not the first a barbarized effort to write ὃ ἐμοῦν—*who* (is) *of me*, i. e. my? And the second a like attempt to express ὅ ἡμιν—*who* (is) *to us*, i. e. our? The reduplication of the o would express the aspirate, and even classical authority (οὑμος for ὃ ἐμός being the Attic contraction; found also Il. 8, 360,) admits the running of the words together. We thus have a curious and familiar legend in both cases.

*1. *King of Kings Great my (of me) Kadphises.*

2. *King of Kings Saviour Great to us Kadphises.*

The other barbarous legends are natural mistakes on the part of ignorant die-cutters directed to employ a new form of words. These, which are barbarisms of execution, are thus easily accounted for: the barbarisms of diction, I would submit, are no where so great in the legends of these coins, as in the barbarous, but still intelligible Greek of the Triballus of Aristophanes, who says (it is his longest speech)—

καλάνι κόραννα κὰι μεγάλα βασιλιναῦ
ὀρνιθι παραδιδωμι. †

* The Pracrit-translated legend should assist us in both these instances, but the reading of the first is declared by Professor Wilson as doubtful, and the second is entered by him illegible at the very point in which we require it.

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† 114-115 lines of the last scene of "the Birds." ποσειδων. τριβαλλος. ἡρακλης. πεισθεταιρος.

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Indeed I rather think our Bactrian and Indo-Scythian barbarisms gain by the comparison. Our κορανο is surely preferable to the drawling feminised κορανα of Triballus; while the βασιλισσα of Queen Agathokleia is so superior to the Triballic corruption of βασιλιναῦ, that one utterly forgives her the ungrammatical memory in which her name is perpetuated. It is a curious and not unvaluable coincidence that gives us in this one line, two of the words for comparison of our slender numismatic vocabulary.

It now only remains to record one or two reflections which naturally ensue upon a review, such as has been here attempted, of indistinct and obscure material for history. The question that suggests itself is, —if the subject does not contain much in itself, to what does it point as a subject for enquiry? The exploration of Kafiristan is one point; and the study of the immigration of nomad tribes into this country another. The first must of course depend upon far other than scientific authority: the second is in the power of any man reasonably familiar with the language and manners of the natives of Upper India. Passing by the latest colony that has settled itself in the land, the Pathans of Rohilkhund, I would suggest the study of that singular race, the Goojurs stamped still with the type of nomads, so lately has their immigration been into Upper India, and from them to the Juts or Jâts, the Thuggas, and other anomalous tribes. All have their traditions, and their simple records, and I suspect that it will be eventually from them, critically examined, that the real internal and popular history of the country will be, if it ever is to be, elicited.

Numismatics are but partially available to this end; but their value is immense; and, with reference to dark portions of history in particular, their study should never be remitted, nor discouraged. It is always unfortunate when any declaration is made *ex cathedra* in science to the effect that a thing is "impossible:" it is equivalent to the act of the disappointed votary who would brick up the archway of the temple because it was not his fortune to make his entry into its penetralia. Much as we owe to Professor Wilson, we do not the less feel that the study of Indo-Bactrian numismatics sustained a check in his announcement that philological discovery was not to be thought of in some of the most salient points of our most interesting period.*

* With reference to the march of discovery, I may mention that whereas in a

When therefore, with all the reverence due to this eminent and respected man of letters, I venture at this particular time to prove that his assertion was erroneous, it is in the ardent hope of resuscitating among our countrymen in the east, and more particularly among the members of this Society, a study which the present position of our Anglo-Indian empire seems so peculiarly to favour.

Report on the Mammalia and more remarkable species of Birds inhabiting Ceylon.—By E. Blyth.

The following notices of the mammalia and birds of Ceylon are founded chiefly on two cases of specimens forwarded for examination by Dr. E. F. Kelaart, of the Ceylon Medical Service, and upon the former contributions of Dr. Templeton, E. L. Layard, Esq., and A. O. Brodie, Esq., but especially of Mr. Layard, who continues very zealously to investigate several branches of the zoology of the island.

MAMMALIA.

Quadrumana.—Of five species (or very distinct races) of Monkey in Ceylon, one only is known to inhabit the neighbouring mainland. This is Presbytis priamus, Elliot, nobis (*J. A. S.* XIII, 470, XVI, 732), the small crested *Húnumán* of peninsular India, which is common in the Jaffna peninsula at the extreme north of the island, and probably to some distance farther south : but generally over the low northern half of Ceylon, we have in its place the Pr. thersites, Elliot, nobis (*J. A. S.* XVI, 127, XVII, 248), a very similar race but

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recent paper in the Journal, I quoted Bunsen's new Egyptian chronology, I have now lying before me (sent from England by our able friend, Mr. Laidlay) the thirteenth edition of Gliddon's Ancient Ægypt, in the appendix to which he notes that the more recent discoveries of Lepsius and the Prussian literati "will carry the age of Menes some centuries beyond B. C. 3643, back by the incontrovertible testimony of the Pyramidal *monuments*."

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nearly as large and powerful as Pr. entellus of Bengal, and which is further distinguished from Pr. priamus by having no abruptly rising compressed vertical crest, nor the radiating centre of hairs a little behind the brow seen in the various other entelloid Monkeys. Its white beard and whiskers are also more conspicuously developed, and contrast strongly with the black face and dark body. According to Dr. Kelaart, they are respectively known as the *Maha* or ('great') *Wanderoo*, and the *Sadoo* (or 'white') *Wanderoo*. The Pr. cephalopterus he indicates as the *Kaloo* (or 'black') *Wanderoo*, and the Macacus sinicus as the *Riláwa* of the Cinghalese.* Mr. Layard states that Pr. cephalopterus is "the common black Monkey of the maritime provinces, very common also in the Kandyan districts; about Trincomali it is replaced by Pr. thersites, and in the Jaffna peninsula by Pr. priamus, which last is particularly abundant about Point Pedro."† Dr. Kelaart, however, has now presented the Society with a fine adult male of the mountain or Kandyan representative of Pr. cephalopterus from Newera Elia; and it is quite as different from the small animal of the coast as Pr. thersites is from Pr. priamus. General aspect the same, but considerably larger and more powerful, with a much longer and very full coat, the piles on the sides measuring 4 to 5 in. long:‡ colour nearly uniform greyish brown-black, with contrasting long white whiskers; the brows, hairs on cheeks, and those on the hands and feet, are deep black; there are traces of a paler tinge just perceptible on the occiput and about the croup; and the terminal three-fourths of the tail are grey. Entire length of hand 5 in., and of foot $6\frac{1}{2}$ in. It is probable that this mountain animal varies in colour like Pr. cephalopterus of the coast, to black, grey, grizzled, or light rufous-brown; but all we have seen of the latter race

* Here it may be repeated that the name *Wanderoo*, as applied to Pr. cephalopterus in particular, has been transferred by most writers to a widely different Monkey, of merely somewhat similar colouring,—the Macacus silenus, which inhabits Travancore and Cochin, but has not been observed wild in Ceylon.

† According to a letter since received from Dr. Kelaart, Pr. priamus would seem also to inhabit the hilly country about Kandy.

‡ In this it resembles the other mountain species of the genus, as the Himalayan *Lungúr*, Pr. schistaceus, Hodgson, (a very strongly marked race, for habits of which vide *J. A. S.* XIII, 472,) and in a less degree Pr. Johnii of the Nilgiris.

have had the albescent hue of the croup strongly contrasting, much more so than in Pr. Johnii of the Nilgiris, and the head generally brown as in the latter species, contrasting (though less so than in Pr. Johnii) with the black of the body (vide *J. A. S.* XVI, 1271). Should it be deemed worthy of a name, it might be designated Pr. ursinus.* Other species nearly affined in all but colour to Pr. cephalopterus, are Pr. pileatus, nobis, from the Tippera, Sylhet, and Khásya hills, and Pr. maurus, (L.), from Java. In fact, most of the black and rufous species of Presbytis are very closely affined, and several that are undoubtedly distinct are only separable apart by what might be considered trivial and insufficient distinctions. Another quadrumanous inhabitant of Ceylon is the Stenops gracilis, which is also found on the Coromandel coast.

Cheiroptera.—The two common frugivorous Bats of India generally, Pteropus edulis (vel Edwardii, &c.), and Cynopterus marginatus, are equally abundant in Ceylon. Dr. Kelaart sends a third, which is probably Pt. Leschenaultii, Dumeril, though not completely according with the descriptions. This small *Roussette* (or 'Flying Fox') measures about 6 in. from muzzle to tail-tip, the tail being about $\frac{3}{8}$ in., and having its basal third invested by the interfemoral membrane. Expanse 19 or 20 in. Head $1\frac{3}{4}$ in. Ears $\frac{5}{8}$ in. Radius 3 in. Tibia $1\frac{1}{2}$ in. Foot with claws 1 in. Upper-parts very thinly covered with short downy fur, of a dull brown colour; lower-parts rather more densely covered with much paler brown fur. A specimen procured by Mr. Elliot somewhere on the Coromandel coast

* "At Newera Elia, and scattered over the colder parts of the island, is a species of very large Monkey of a dark colour: some of those I saw were much bigger than the *Wandura*; and one that passed some distance before me, when resting on all four feet, looked so like a Ceylon Bear" *(Ursus labiatus)*, "that I nearly took him for one." Forbes's 'Eleven Years in Ceylon,' II, 144. In a letter recently received from Dr. Kelaart, he remarks that he has now several specimens of this Monkey, one procured within 20 miles of Kandy. "Not one of them has the grey croup of Pr. cephalopterus, and the hairs of the hands and feet are, in all, jet black. The ferruginous tinge of the hairs of the head and the grey of the occipital are present in all. The arms, too, are shorter than in Pr. cephalopterus of the low country. So that we may now consider this animal as distinct and confined to the mountainous regions of Ceylon—only in the Newera Elia specimens, the fur is longer and the tail more albescent."

appears to be of the same species; but has the upper-parts much more fully covered with brown fur, darkest upon the crown, and a whitish collar round the lower part of the neck. The hair on the sides of the neck is longish and directed forward. Length of radius $3\frac{1}{4}$ in. The difference partly depends, no doubt, on the season in which the specimens were obtained: and the only other frugivorous Bat known to inhabit India is Pt. Dussumieri, Is. Geoff. (vide *J. A. S.* XII, 176).

Taphozous longimanus, (Hardwicke), is a species and genus added by Dr. Kelaart to the fauna of Ceylon.*

Megaderma lyra, Geoff. (v. *M. carnatica*, Elliot, et *M. schistacea*, Hodgson), appears to be common.

The species of Rhinolophinæ would seem to be numerous. Of true Rhinolophus, Mr. Waterhouse gives Rh. insignis, Horsfield, with a mark of doubt against the specific name, from Ceylon, in his Catalogue of Mammalia in the museum of the Zoological Society (1838); and we have seen no true Rhinolophus from the peninsula of India, unless Rh. mitratus, nobis (*J. A. S.* XIII, 483), from Chaibasa be deemed an exception.† But of Hipposideros, Gray, there appear to be many species in Ceylon. Of the three noticed in Mr. Elliot's Catalogue of the mammalia of the S. Mahratta country (*Madr. Journ.* X, 98), viz. H. speoris, H. murinus, and H. fulvus (vide, *J. A. S.* XIII, 489), the first two are common; and H. ater, Templeton, is a third described in *J. A. S.* XVII, 252. The last we have not seen; and Dr. Kelaart now sends two species additional to a specimen of H. murinus. These are probably H. vulgaris, (Horsf.), apud Gray, of India, and H. pusillus, (Tem.), of India, the specific name given with doubt by Mr. Waterhouse (*Catal. Zool. Soc. Mus.*). The first, though nearly affined to—is certainly not identical with—Rh. vulgaris apud nos, *J. A. S.* XIII, 488, from Arakan. Length about 3 in., of which the tail is $\frac{11}{16}$ in.; expanse about 12 in., or nearly so; radius 2 in.; tibia $\frac{7}{8}$ in.; ear-conch $\frac{1}{2}$ in. The membrane surmounting the frontal pits exhibits three distinct small longitudinal

* T. brevicaudus, nobis, *J. A. S.* X, 970, is another species likely to occur, as it was described from a specimen procured in Travancore.

† In a letter, Dr. Kelaart informs us that he has now obtained a very large Hipposideros, and likewise a Rhinolophus as this genus is at present restricted.

ridges. Fur of the upper-parts pale greyish-brown at base, then dusky-brown which gives the prevailing hue of the surface, with very slight pale extreme tips. Lower-parts nearly uniform brown, with also slight hoary tips. Membranes dark. The other (H. ATER ?) is smaller, and possibly a variety only of H. MURINUS, which (so far as can be traced in the dry skin) it resembles in structure. Colour whitish above, with blackish tips to the fur, the two colours being equally conspicuous; and below whitish-brown. These Bats cannot be properly described unless when fresh or preserved in spirit.

The genera RHINOPOMA and DYSOPUS have probably yet to be discovered in Ceylon. No doubt RH. HARDWICKII and D. PLICATUS exist there.

Of ordinary Bats (VESPERTILIONINÆ), the NYCTICEJUS HEATHII, Horsfield, appears to be very common, as generally over the peninsula of India. In Bengal it is replaced by a smaller species of similar colouring.* N. BELANGERI, (Tem.), is common to India generally and the Burmese and Malay countries, being in Ceylon equally abundant. To these Dr. Kelaart adds another of about the same size, which was long ago forwarded from Chaibasa in Central India by Capt. S. R. Tickell, and may now be described as

N. TICKELLI, nobis, *n. s.* Length $4\frac{3}{4}$ in., of which the tail measures $2\frac{1}{8}$ in.; expanse 16 in.; length of fore-arm $2\frac{3}{8}$ in.; of longest digit

* N. HEATHII, Horsfield, *P. Z. S.* 1831, p. 113. Length (of an adult male, in spirit,) 6 in., of which the tail measures $3\frac{3}{8}$ in.; alar expanse $16\frac{1}{2}$ in.; fore-arm $2\frac{5}{8}$ in.; longest finger $4\frac{1}{2}$ in.; tibia $1\frac{5}{8}$ in.; foot with claws $\frac{9}{10}$ in. The difference of bulk and of size of the head, on comparison of this with the next species, exceeds that of the linear dimensions. The skull, also, with the teeth, is much larger in N. HEATHII, measuring $1\frac{1}{8}$ in. in length, inclusive of the sagittal ridge and more protruding lower jaw; the upper canines project more than $\frac{3}{16}$ in. from their bony sockets. HAB. Central and S. India, and Ceylon.

N. LUTEUS, nobis, *n. s.* Length (of a large male) $5\frac{5}{8}$ in., of which the tail measures $2\frac{1}{4}$ in.; expanse $14\frac{3}{4}$ in.; fore-arm $2\frac{1}{4}$ in.; longest finger $3\frac{3}{4}$ in.; tibia $1\frac{5}{16}$ in.; foot and claws $\frac{1}{2}$ in. The entire length of skull is barely 1 in., inclusive of the greatly developed sagittal ridge. HAB. Bengal; Coromandel.

In structure, both resemble N. BELANGERI, and both have the upper-parts, when fresh, of a very rich tawny or golden-brown colour, having a slight greenish cast; the lower parts fine yellow, more or less deep, and not unfrequently tinged with fulvous. By exposure to light, the colours fade much in both species, the rich yellow tinge gradually disappearing.

$4\frac{1}{4}$ in.; tibia $1\frac{5}{16}$ in.; foot with claws $\frac{1}{2}$ in.: ears anteally, from lowermost base, $\frac{5}{8}$ in.; and externally hairy for the basal half. Fur moderately long, soft, and straight, or a little wavy; of a pale fulvescent or whitish-fulvous colour, more or less tinged with maronne or vinous on the back: the membranes dusky, marked along the digits as in KERIVOULA PICTA, but the brighter colour spreading less upon the membrane, though the interfemoral is chiefly or wholly of this hue. There is a considerable growth of hair upon the basal half of the interfemoral membrane above, also along the tibia, and especially upon the tocs: the face likewise is hairy around the eyes, and on the muzzle. Ears triangular and obtusely pointed: the tragus broad and semi-circular, and suddenly narrowing at tip. Lastly, the dentition exhibits a peculiarity; this animal having a short, flat, obtusely trilobate or quadrilobate second pair of upper incisors, situate posteriorly to the usual large pair, and immediately behind the contact of each of the latter and the canine of the same side. This we have seen in no other species. HAB. Central India, Ceylon, and doubtless the intervening hilly country.

KERIVOULA PICTA, Gray; *Vespertilio pictus*, Pallas (originally described from Ceylon); *V. kerivoula*, Boddaert: *Kehal voula*, Cingh. (Kelaart). Specimens sent dry and in spirit by Dr. Templeton and Mr. Layard are perfectly identical in species with one received from Java; and Dr. Cantor met with this species also at Pinang. Schinz gives it from Java, Sumatra, Borneo, and, doubtfully, Ceylon. Mr. Layard says of it, "I have only met with this species about Colombo in any abundance, and I obtained one solitary specimen at Ambegamoa." Mr. Gray notices a K. SYKESI (we believe still undescribed), from "India, Calcutta;" this we do not know: but in Lower Bengal (where apparently very rare) and in Central India, there is a fine species of nearly the same remarkable colouring, which is likely to be sometimes mistaken for K. PICTA, though differing from it in many particulars. It appears to be VESPERTILIO FORMOSUS, Hodgson, *J. A. S.* IV, 700, assigned by Mr. Gray to his KERIVOULA, though improperly if it be the species here referred to, which accords in the number of its teeth with Mr. Hodgson's description, supposing that its exceedingly minute second upper præmolar was overlooked. This species and K. PICTA and NYCTICEJUS TICKELLI present the same

remarkable and beautiful style of colouring; but the dentition and other characters differ.* The NYCTICEJUS has the short and very broad muzzle, strongly developed sagittal, occipital, and parietal crests, and comparatively powerful teeth with the upper *carnassiez* adjoining the canine, which we observe in N. HEATHII and the species affined to it; and there are two præmolars below, of which the second is the longer. VESPERTILIO FORMOSUS (?) has three præmolars below, of which the medial (or that next to the *carnassiez*) is minute; and the upper *carnassiez* is widely separated from the canine, and in the interval are one developed præmolar, and posterior to this another which is excessively minute and liable to be overlooked: there are no ridges to the skull, or the middle one is barely traceable; the muzzle is comparatively narrow; and there are two upper incisors on each side of equal size: chaffron a little concave. In KERIVOULA PICTA the chaffron is highly concave, the muzzle again much narrower, and there are two pairs of upper incisors of which the inner are longer, and so placed that on a direct front view they are alone visible, the second pair being concealed behind them; in V. FORMOSUS (?) the four are equally visible on a front view. There are two præmolars of equal size between the upper canine and the *carnassiez*, and two below of scarcely inferior size to the third or lower *carnassiez*. Lastly, the ears of V. FORMOSUS (?) are not those of a KERIVOULA (as exemplified by K. PICTA), but are deeply emarginated externally at one-third of their length from the base, and above comparatively narrow and obtusely pointed: tragus also broader, shorter, and less attenuated at tip.

The only other Bat we have yet seen from Ceylon, is a minute species which appears to be extremely common throughout India, and is also met with at Singapore. We believe it to be V. COROMANDELICUS, F. Cuv., and to be identical with V. IRRETITUS, Cantor (*Ann. Mag. N. H.* IX, 481), from Chusan; and V. MINUTUS, Temminck, from the Cape of Good Hope, would seem to approximate, so far as can be judged from the brief description of Prof. Schinz. Size of the Pipistrelle,† or on the average somewhat shorter in the

* We have since received another and remarkably handsome large species of NYCTICEJUS, with similar colouring of membranes, from the Khásya hills,—N. ORNATUS, nobis,—a description of which will appear in a subsequent article.

† On comparison of British specimens of the Pipistrelle with an example in spirit sent by Mr. Hodgson from Nepal with the MS. name *V. pallidiventris*, we could

fore-arm, which does not exceed $1\frac{1}{8}$ in. in length; longest digit 2 to $2\frac{1}{8}$ in.; expanse rarely exceeding $7\frac{1}{2}$ in.* Total length $2\frac{5}{8}$ in., of which the tail measures $1\frac{1}{8}$ in.; ears broad, exceeding $\frac{1}{4}$ in. in length; tragus $\frac{1}{8}$ in., appearing lanceolate in the dry specimen, but in the fresh animal somewhat lunate, or a little curved forward and obtuse at tip. The fur is short, as compared with that of the Pipistrelle, and dingy fulvous-brown above at the surface, below paler and greyish-fulvous: membranes dusky. The skull rather exceeds $\frac{1}{2}$ in. long: the upper *carnassiez* is all but contiguous to the canine, and there is a minute præmolar situate internally and not visible externally; and two lower præmolars, of which the second or *carnassiez* is longer by about a third than the first. This Bat belongs to that large division of SCOTOPHILUS, Leach (apud Gray), the species of which have permanently two pairs of small upper incisors of about equal size: to these we prefer to restrict the name SCOTOPHILUS, reserving NYCTICEJUS for those in which the adults have only one large incisor on each side. Accordingly, we term it (though somewhat doubtfully) SCOTOPHILUS COROMANDELICUS. This diminutive species is remarkable for the extreme velocity of its flight, as particularly shewn when darting about a room after being molested; and it is the most common of the small Bats about Calcutta. Mr. Hodgson did not meet with it in Nepal, and it probably does not inhabit the sub-Himalayas. It is the No. 12 of Mr. Elliot's list in the 'Madras Journal of Literature and Science,' X, 99.

CARNIVORA.—Dr. Kelaart sent flat skins of what he considered to be two varieties of Jackals: but we regard them as mere individual variations of colour, such as are seen in all parts of India. No other wild canine animal has hitherto been discovered in the island.

Of VIVERRIDÆ, the Civet of Ceylon is probably not VIVERRA ZIBETHA, L., as supposed by Mr. Layard, but of a race procured by Mr. Walter Elliot from Travancore, and of which a specimen exists in the museum of the Zoological Society, referred to V. ZIBETHA in Mr. Waterhouse's Catalogue of the mammalia in that collection (1838), No.

discover no difference whatever. According to Schinz, the same species further inhabits Japan.

* Dr. Cantor gives 8 in. as the expanse of his *V. irretitus*, but the other measurements sufficiently correspond.

252. In that Catalogue it is marked "Sumatra, donor, Sir Stamford Raffles;" but we are the more inclined to suspect a mistake, both as regards the donor and the habitat, from its being stated (formerly at least) on the label of the specimen to have been presented by the Duke of Northumberland. Both Mr. Elliot's Travancore specimen and that in the Zoological Society's museum exactly resemble the African V. CIVETTA, except that the dorsal mane ceases between the shoulders, instead of being continued forward to between the ears.

VIVERRICULA MALACCENSIS, (Gm.), and PARADOXURUS TYPUS, F. Cuv., sent by Dr. Kelaart, as previously by Mr. Layard, are perfectly similar to Bengal specimens. There is also in the island P. ZEYLONICUS, (Schreber), a very young example of which was formerly sent to the Society by Dr. Templeton, then of Colombo. This young animal is uniformly of the colour of the upper-parts of MUSTELA VULGARIS, merely a little paler below, and shewing no decided trace of the longitudinal dorsal stripes. A living pair was afterwards presented to us by A. O. Brodie, Esq., of Putlam. These were then not fully grown, and were paler than the last, with the limbs darker, and the three longitudinal dorsal streaks distinct. The female died in this colouring, and is now preserved in the Society's museum; but the male still lives, and has become considerably deeper in his general hue. Of two specimens now sent from Newera Elia by Dr. Kelaart, one is again deeper-coloured than the living male, except its tail which is paler, and the dorsal stripes are inconspicuous though distinctly traceable: the other is much darker, considerably more so indeed than LUTRA VULGARIS, with remarkably handsome fur, and no trace of the dorsal streaks; the tail paler, with a subterminal yellowish-white ring,—exhibiting thus the tendency to partial albinism which is so often observable about the tail-tip, and sometimes the feet and even the body, of animals of this genus, as especially the common P. TYPUS. We do not hesitate in considering all these varieties of colour in different specimens of P. ZEYLONICUS to have no specifical importance; but upon present data it seems probable that those which inhabit high upon the mountains (*P. montanus*, Kelaart,) have finer and darker-coloured fur than those of a lower region.

There are four species of Mungoose (HERPESTES) in Ceylon: H. VITTICOLLIS, (Bennet), is not uncommon in the interior; and H.

GRISEUS, (Geoffroy), appears identical with the race of Bengal, the nose and paws of the only specimen we have seen being, however, considerably darker. This specimen was sent by Mr. Layard from the Jaffna peninsula; and he remarks that there is "another variety at Trincomali which accords exactly with the Indian animal." Dr. Kelaart states, in a recent communication, "I have now two other species of HERPESTES besides the H. GRISEUS and H. VITTICOLLIS, —one like H. AUROPUNCTATUS, Hodgson, but not it: it is very like H. GRISEUS, except that the grey of the hair is in this fulvous or yellow (if new, *H. fulvescens*, mihi): the other is of a dark ruby-red; tip of tail and feet black; ferruginous-red face; and as large as H. VITTICOLLIS." The former of these is probably H. AUROPUNCTATUS; and the latter, we have little doubt, is a very distinct species formerly sent on loan by Mr. Elliot, who procured it in the south of India, but has not yet given it a name, so far as we are aware. His specimens, however, were smaller than adult VITTICOLLIS, and more affined to GRISEUS in structure.*

FELIDÆ. Of Cats, there are, in Ceylon, F. PARDUS (vel *leopardus*) and its black variety, F. VIVERRINUS, and F. CHAUS. F. TIGRIS and F. JUBATUS are unknown: and F. BENGALENSIS (var. *wagati*, Elliot), and F. RUBIGINOSA, Is. Geoffroy, (both inhabitants of peninsular India,) remain probably to be discovered.

MUSTELIDÆ. The only Otter we have seen from the island is LUTRA NAIR, F. Cuvier, which is not uncommon; and it is also the only species which we have seen from the peninsula of India, unless a particularly large skin procured in Travancore and sent on loan by Mr. Elliot, may

* The following notes were taken of them; and we may here characterize the species as—

H. ELLIOTI, nobis. Entire length 26 in., of which the tail measures half: length of fore-limb, to end of claws, 3⅜ in.; and of hind-foot with claws 2¼ in. General colour as in H. FUSCUS, Waterhouse, of the Nilgiris, but the pale portion of the annulated hairs whiter,—the four limbs blackish above,—and the tail (which is less bushy than in H. FUSCUS) tipped with black for the terminal 2½ or 3¼ in. In this specimen there was an appearance of a collar, from the greater development of the blackish portion of the hairs and of the whitish portion lower down, in those forming a sort of nuchal ring. Another specimen had the general cast of colour redder,—a maronne-red prevailing, very bright on the four limbs above the black feet, and upon the tail where bordering on its black tip. HAB. S. India.

prove to be that of another. This specimen is remarkable for having the whole upper half of the head and body and of the basal moiety of the tail, covered only with the short and close downy fur common to the genus, with merely a very few scattered piles of the ordinary longer fur intermixed. The under half of the head and body and rest of the tail are clad as usual, precisely as in L. NAIR and similarly coloured; but what is remarkable, is the abrupt and well defined straight line of demarcation separating the upper and lower halves of the animal, and passing immediately below the ear-conch. We suspect, however, (in fact feel satisfied,) that the individual was killed while changing its coat; but its size is still remarkable, being equal to that of the common Bengal Otter (L. CHINENSIS, Gray, vel *tarayensis*, Hodgson, &c.). Nevertheless, we consider it identical with L. NAIR.

URSIDÆ. The Bear of Ceylon is the URSUS (vel PROCHILUS) LABIATUS of all India southward of the Himalaya, and which is peculiar to this country.

INSECTIVORA. SOREX is the only genus as yet ascertained; but the discovery of TUPAIA ELLIOTI, Waterhouse (*Proc. Zool. Soc.*, July 24th, 1849), in the eastern ghâts of peninsular India, renders it likely that this genus also may have its representative in Ceylon. Perhaps, also, the Hedgehog of the Nilgiris (ERINACEUS MICROPUS, nobis, *J. A. S.* XV, 170), or other species of this genus, may inhabit the island; the more especially as Dr. Kelaart remarks that there are two species of Hedgehog preserved in the Medical Officer's museum at Colombo, though whence brought is unknown. SOREX MURINUS, L. (apud Gray), the common Indian Musk Shrew, is mentioned both by Mr. Layard and Dr. Kelaart; and the latter gentleman has forwarded two mountain species for examination, both of which we consider to be new and undescribed.

S. MONTANUS, Kelaart, *n. s.* A typical SOREX, with dentition, &c., as in S. MURINUS. Total length 6 in., of which the tail measures $2\frac{1}{4}$ in.: hind-foot, minus claws, $\frac{5}{8}$ in. Colour uniform dusky or dusky-slate, with the tips of the fur rufescent. Dr. Kelaart sent two specimens from Newera Elia, which, most decidedly, are of the same species; but one of these had a very powerful odour when fresh, and the other was inodorous.

S. (?) MACROPUS, nobis, *n. s.* General aspect of typical SOREX,

with colourless teeth and scattered long hairs on the tail; the ears scarcely visible beyond the fur; and the feet remarkably large. Length about $6\frac{1}{2}$ in., of which the tail is $2\frac{1}{4}$ in.; hind-foot with claws nearly $\frac{7}{8}$ in.; the fore-foot $\frac{1}{4}$ in. broad, with long and but slightly curved claws, that of the middle digit $\frac{1}{4}$ in. in length. Fur somewhat long and very soft, uniform blackish, very faintly tinged rufescent; the extreme tip of the tail dull white in the only specimen examined. Teeth small: the upper quasi-incisors shorter and less strongly hooked than in the typical SORICES, with the posterior spur large; the lower quasi-incisors serrated, shewing two depressions, and therefore a row of three coronal points. Behind the upper false incisors a series of four small præmolars precedes the *carnassiez*, the two medial being of equal size, the first rather large, and the fourth smaller; and below are the usual two (inclusive of the *carnassiez*), as in the genus generally. Accordingly, this species cannot be brought satisfactorily under any of the subdivisions of SOREX yet instituted; and its very large feet, more especially, indicate that it should form a particular subdivision. Both this and the preceding species are found at Newera Elia and to 1000 ft. below.*

In additon to S. MURINUS, S. MONTANUS, and S. MACROPUS in Ceylon, Dr. Kelaart writes that he has lately received two specimens of a large black Shrew double the size of the last, which he also considers to be distinct and probably undescribed.

* The Shrews have very anomalous dentition; and we consider their quasi-incisors above and below to be *modified præmolars*. The upper canines appear to be wanting throughout the order, and the lower canines when present are generally small, the first præmolar above and sometimes below being magnified to assume the form and fulfil the function of canines (vide XIX, p. 216). In the Shrews no intermaxillary bones have been traced at any age, and therefore the upper front teeth are decidedly not incisors, as they are generally termed: if canines, they would be an anomaly throughout the order; and extracted from the socket they have more the character of præmolars, exhibiting a second fang coalescent or imperfectly separated, (i. e. originally distinct, no doubt,) proceeding from the posterior spur or cusp. The lower front teeth have also two coalescent fangs, shewing a broad and deep median groove on the inner side, and a similar but less extended groove on the outer. Thus, at least, in S. MURINUS. It is not unlikely that in some of the other species (or subgeneric forms) the two fangs may be permanently separate.

Rodentia. Sciuridæ. Of this family, Dr. Kelaart sends two species of Flying Squirrels. One is Pteromys oral, Tickell, found throughout the peninsula of India. The other is a magnificent Sciuropterus, which possibly may be a fine adult of the species described as Sc. fuscocapillus, Jerdon, nobis, *J. A. S.* XVI, 867, from a younger and comparatively inferior specimen. We incline, however, to the opinion that it is distinct; and Dr. Kelaart terms it

Sciuropterus Layardi, Kelaart. Nearly affined to Sc. caniceps, Gray, of the S. E. Himalaya, from which it differs in having the fur of its under-parts of a dull non-fulvescent white, the parachute membrane being margined with pure white fur, lengthened and conspicuous at the angle. Face grey, except the forehead which is rufous-brown, like the rest of the upper-parts. A dusky spot on the nose. Whiskers long and black; and there is a tuft of long soft hairs below the ears, and a smaller tuft before them. The ear-conch is $\frac{3}{4}$ in. long posteriorly, ovate and somewhat narrow. Fur very dense, the basal three-fourths of the piles dusky, sinuous, and fine in texture; the tips coarser, and shining dull rufous-brown, forming the surface-colour. Tail flat and broad, above nigrescent, and below deeper blackish except at tip. Feet greyish, with a faint rufous tinge on the hind only. Length about 2 ft., of which the tail with hair measures half: hind-foot, from heel to tip of claws, $2\frac{1}{2}$ in.: fore-foot, to membrane, $1\frac{1}{2}$in. Hab. Mountains of Ceylon (Dimboola).

The Sciuri of Ceylon are treated of in *J. A. S.* XVIII, 600 *et seq.*, where five species are enumerated, to which Dr. Kelaart has now added Sc. trilineatus, Waterhouse (v. *Delesserti*, Is. Geoffroy), identical with the race of the Nilgiris and Malabar. He has also favored the Society with a fine example of Sc. Tennentii, Layard, *loc. cit.*, perfectly similar to that sent by Mr. Layard; and with a young specimen of Sc. macrourus, remarkable for having the terminal three-fourths of its tail unmixed white or slightly yellowish white. "The Sc. macrourus," he remarks, "I have seen of various colours; some black: and I am inclined to think the Sc. Tennentii only a large variety of it. Sc. macrourus even changes colour from brown to black." Mr. Layard, however, insists that "Sc. macrourus, the common large Squirrel of our western coast, never intrudes on the haunts of Sc. Tennentii, nor is intermingled with it in its own loca-

lity." The two seem to hold, therefore, the same mutual relation as PRESBYTIS THERSITES and PR. PRIAMUS, or PR. URSINUS and PR. CEPHALOPTERUS.*

* The rufous-capped striped Squirrel noticed in a foot-note to *J. A. S.* XVIII, 602, Mr. Layard terms Sc. KELAARTI, Layard; but it does not appear sufficiently distinct from Sc. BRODIEI. According to Mr. Layard, "Sc. TRISTRIATUS is the common low country Squirrel" (of the island): "Sc. BRODIEI is common on the west coast from Point Pedro and Putlam; replacing Sc. TRISTRIATUS, from which it is easily distinguishable by its pale colour and the long pencil-tuft at the extremity of the tail,—this, however, is often wanting in stuffed specimens, and indeed even in live ones, the hair being but slightly attached to the skin: Sc. KELAARTI entirely replaces all the other small SCIURI from Tangalle and Hambantotte, and I should fancy extends round to Trincomali. It may be described as very like Sc. PALMARUM of India, but the head is much redder, the halves of the back and belly are more blended, and the animal is altogether smaller." These three little Squirrels, if different, are exceedingly affined; and all have the rufous colouring under the tail which is never seen in Sc. PALMARUM. It would be interesting to ascertain if their voices differ, for that of Sc. TRISTRIATUS is remarkably unlike the voice of Sc. PALMARUM.

In XVIII, 603, it is remarked that there are no SCIURI more difficult to understand than the group exemplified by Sc. MODESTUS, Müller, &c. The three Darjiling specimens there referred to, as having the thighs externally of a bright ferruginous colour, exemplify the Sc. LOKRIAH, Hodgson, apud Gray, who terms it the "Red-thighed Squirrel" (vide *Catal. Brit. Mus. Mammal.)*; and the Sc. LOKRIAH, H., apud nos *(J. A. S.* XVI, 873), Mr. Gray designates as Sc. SUBFLAVIVENTRIS, McClelland. In Dr. Cantor's list of the mammalia of the Malayan peninsula, Sc. MODESTUS, S. Müller, is cited as a doubtful synonyme of Sc. TENUIS, Horsfield, and the habitats given by Dr. Müller ("Java, Sumatra, Borneo, Canton,") are transferred; but Mr. G. Moxon has recently presented the Society with a specimen from Malacca, which we take to be the Malayan peninsula race referred to Sc. MODESTUS, and which is very distinct from Sc. TENUIS of Java, and apparently differs also from the Sc. MODESTUS figured by Dr. Solomon Müller. Length about 8 in., of tail 9 in., its hair reaching 2½ in. farther; hind-foot with claws 1¾ in. Colour of the upper parts grizzled black and golden-fulvous, deeply tinged with ferruginous on the croup and tail: under-parts pale ashy; and limbs grizzled ashy externally: whiskers long and black: terminal two-thirds of the tail banded with black, the alternating fulvous bars whitish towards the end: no ferruginous on the face, sides and limbs, as in Dr. S. Müller's figure of Sc. MODESTUS. From Sc. NIGROVITTATUS, it differs in having no lateral stripes, nor the rufous tinge about the muzzle and cheeks; also in the decided ferruginous tinge of its croup and tail, and the very distinct bands upon the latter. In the same collection were

Muridæ.—Of the Rat tribe, Dr. Kelaart has forwarded

1. Gerbillus indicus, F. Cuvier; from which we now doubt whether *G. Cuvieri*, Waterhouse, and *G. Hardwickii*, Gray, differ constantly in any respect (vide *J. A. S.* XV, 138). At least, specimens are perfectly similar from different parts of Bengal, S. India, and Ceylon; but we have not yet examined the skull of a Cinghalese example. Dr. Kelaart remarks that Kandyan examples differ in no respect from the Gerbil of the plains of Ceylon.

2. Golunda Elliotti, Gray, *Mag. N. H.* 1837, p. 586: *Mus hirsutus*, Elliot; *M. coffæus*, Kelaart. "The Coffee Rat of Ceylon, a very destructive species, rooting up the coffee trees, and nearly destroying whole plantations in one night, when some plant on which they generally live is scarce in the jungle." (Kelaart.)

3. G. meltada, Gray, *ibid.*: *Mus lanuginosus*, Elliot; *M. newera*, Kelaart. We have little doubt about the correctness of the identification of this species, although there is no S. Indian specimen in the Society's museum to compare with it. In this type, as in Gerbillus, the upper rodential tusks are distinctly grooved.

4. Mus bandicota, Bechstein: *M. giganteus*, Hardwicke; *M. ikria*, Buch. Ham.; *M. nevorivagus*, Hodgson, &c. "Common in the paddy-fields round Cotta, doing great damage to the crops and embankments; the natives consider them very good-eating." (Layard).

(Mr. Layard has also procured M. indicus, Geoffroy, v. *Arvicola indica*, *A. bengalensis*, et *Mus kok*, Gray, *M. providens*, Elliot, and probably *M? pyctoris*, Hodgson, *Ann. Mag. N. H.* XV, 267, if not also *Nesokia Hardwickii*, Gray, *ibid.* X, 265. "Not uncommon about Jaffna. The natives esteem them great delicacies, and they are much sought after.")*

5. M. decumanus, L.

(M. rattus, L. Included by Mr. Layard. In Calcutta, we have only obtained this species from the shipping, and may remark that there is a brown variety of it so much resembling the M. setifer,

three specimens of Sc. laticaudatus, S. Müller, apud Cantor, which is doubtless the *Rhinosciurus tupaioides*, Gray, from Singapore, and possibly distinct from true laticaudatus. One of these has been presented for the Society's museum.

* From a recent letter from Dr. Kelaart, he also appears to have met with this species at Kandy.

Horsfield,—an arboreal species which is very unlikely to be often conveyed about in ships,—that we cannot help strongly suspecting that the black and brownish specimens from Van Dieman's Land assigned to *M. setiger (setifer)* in Mr. J. E. Gray's catalogue of the mammalia in the British Museum, pertain really to the European Black Rat. Of this we have also fine examples from France).

6. M. NEMORALIS, nobis, *n. s. (M. setifer* apud Layard*?) Very like M. SETIFER, Horsfield, but with a considerably longer tail, exceeding the head and body in length in the proportion of five to four.† The whiskers are also blacker, at least than in what we take to be a half-grown specimen of M. SETIFER from Malacca. Dr. Kelaart sent an adult specimen and one two-thirds grown from Ceylon; and Mr. Frith lately obtained three young living examples from a huge nest placed among the branches of a dense mango tree, in the vicinity of Calcutta. Two of these soon after made their escape, and the third we possess in spirit. We have since ascertained its occurrence in the Botanic garden, and other likely sites in the neighbourhood of Calcutta; so that we hope soon to procure some recent examples, from which a proper description may be taken.‡

7. M. RUFESCENS, Gray: *M. flavescens et M. rufus*, Elliot (nec Waterhouse); *M. arboreus*, B. Hamilton, MS. This also is a tree Rat, keeping especially to the cocoa-nut palms, though by no means confined to them. According to Buchanan Hamilton, it nestles in the cavities of trees, and not (like the preceding species) among the branches. We have obtained a single individual variety, in which the white belly is much less abruptly defined than usual. One that escaped in our private residence took up his abode for some days (till we saw no more of him) on the top of a glass folding-door, not burrowing like the com-

* Probably not, however, as Mr. Layard's supposed *M. setifer* was "procured *in a paddy field* near Galle."

† In M. SETIFER, the tail is shorter than the head and body.

‡ An adult procured since this was written was unfortunately carried off by a Kite. We had not the opportunity of actually comparing it with the Ceylon specimens, but it certainly appeared to be specifically identical with them; the belly being merely somewhat albescent. It exhibited a manifest affinity for M. RUFESCENS, but was much larger, less rufescent, and the belly dull whitish instead of pure white. Shot on the bough of a tree.

mon house Rat. They do, however, as Buchanan Hamilton remarks, visit out-houses and similar places by night; but pass the day on trees, chiefly cocoa-nuts (being very destructive to the young fruit), and bamboos.

8. (?) M. KANDIANUS, Kelaart, *n. s.* Very like the preceding species, but the fur softer and of finer texture, and less rufescent in colour. Whiskers very long, fine, and black. Peculiar to the mountains, and we strongly suspect it to be only a mountain variety of M. RUFESCENS; but require to examine more perfect specimens, and to compare the crania and dentition, before coming to a final decision. M. NIVIVENTER, Hodgson, would seem to be affined.

Other species of MUS are enumerated by Dr. Kelaart, as inhabitants of Ceylon; but they require further examination.

HYSTRICIDÆ. A young Cinghalese Porcupine sent alive by Mr. Layard, and since mounted in the Society's museum, is evidently of a new species, most nearly affined to the common but undescribed Porcupine of Bengal. The last and most satisfactory authority upon the species of Porcupine is Mr. Waterhouse's 'Natural History of the Mammalia,' Vol. 2. This author reduces the known species of HYSTRIX as now limited (including *Acanthion*, F. Cuv.,) to four; viz. two crested species of large size, the European and N. African H. CRISTATA, L., and the Asiatic H. HIRSUTIROSTRIS, Brandt (v. *leucura*, Sykes); and two crestless species of much smaller size, the sub-Himalayan H. HODGSONII, Gray (v. *alophus*, Hodgson), and H. LONGICAUDA, Marsden (v. *Acanthion javanicum*, F. Cuv.), of the Malayan peninsula and archipelago. Of these, the Society's museum contains two skulls, a stuffed head, ditto very young animal, and a flat skin (deprived of the crest) of a half-grown example, of H. HIRSUTIROSTRIS; flat skins of old and young of H. HODGSONII; and a stuffed specimen of H. LONGICAUDA: also three skulls (one of them from Asám), agreeing with Mr. Waterhouse's description and figures of the skull of H. HODGSONII; but on two of them the names "*Hystrix cristata*" and "Crested Porcupine" are written by one of our predecessors, so that they perhaps belong to the small crested species of Bengal, and not to the sub-Himalayan crestless Porcupine.* No. 1 is that of an old animal,

* In Mr. Walker's list of the mammalia of Asám *(Calc. Journ. Nat. Hist.* III, 267), the only Porcupine mentioned is H. CRISTATA, which should at least indicate the existence of one of the crested species in that province.

and is rather larger than the two described by Mr. Waterhouse; measuring 5¼ in. in total length: No. 2 (from Asám) is 5 in. long: and No. 3 is that of a young animal, in which the naso-frontal sutures form each a straight line, meeting its opposite at an obtuse angle posteriorly; this, however, is merely due to immaturity, the forehead not having commenced to bulge as in the adult animal. H. HODGSONII and H. LONGICAUDA are nearly affined species, but exhibit well marked distinctions in the cranium: and externally they are most readily characterized apart by the latter having a strongly marked white demi-collar, proceeding upward from the throat, which either does not occur or is barely indicated in the other, and by its body spines (*i. e.* spinous bristles, as distinct from the quills,) terminating in sharp and rigid points, not flexible and setaceous tips as in H. HODGSONII.

The common Bengal Porcupine (and of Asám?, Sylhet, and Arakan, rare near Calcutta),—H. BENGALENSIS, nobis,—resembles the two last mentioned in size and general character;* and like them it does not possess the two great lateral masses of very long, slender and flexible quills, impending and concealing the much shorter, thick, rigid and acutely pointed quills which constitute the armature of the animal: but it has only a very few long and slender quills, gradually thickening in the basal half and attenuating much in the terminal half, intermixed with the ordinary or weapon-quills towards the front and at the sides. The latter are much longer and thicker than in the two crestless species; and the body-spines are still flatter and more strongly grooved, and terminate towards the neck in slight setæ, towards the quills in rigid points. There is a distinct but small thin crest, (not dense and *massive*, as in the two large species,) the longest bristles of which measure 5 or 6 in., and are tipped with white for the terminal third: and the white demi-collar is as strongly marked as in H. LONGICAUDA. General colour as in H. HODGSONII; the quills generally having the basal half white, the rest black, most of them with a white tip more or less developed: the few long and flexible

* Or it may attain to a larger size, though not nearly to the magnitude of H. CRISTATA and H. HIRSUTIROSTRIS. Since the above descriptions were written, we have seen, in the Barrackpore menagerie, fine living examples of H. HIRSUTIROSTRIS, H. BENGALENSIS, and the ATHERURA inhabiting the Tippera and Khásya hills, which latter is well figured and described by Buchanan Hamilton.

quills are white, with a narrow black band about the centre. Tail as in the two crestless species, with similar pedunculated quills.

The Cinghalese Porcupine sent by Mr. Layard, though young, we do not hesitate to name as another distinct species—H. ZEYLONENSIS, nobis. Fortunately, we have a stuffed Bengal Porcupine of about the same size and apparent age to compare with it. It is nearly affined to H. BENGALENSIS, with a similar but more developed crest of long bristles; these are of the same brown colour as the body spines, and have each one obscure pale annulation and beyond it a white annulation at less than two-thirds of its length: the quills are slenderer than in the Porcupine of Bengal, and are black, with white extreme base; mingled with others longer and more slender, which are chiefly very pure white, often with dark base. Spines much flattened and grooved, and very much coarser over the limbs than in H. BENGALENSIS; the anterior terminating in very slight flexible setæ, becoming gradually obsolete towards the quills. Upon the hind-limbs especially, the spines are quite as coarse as on the sides of the body; whereas in the Bengal Porcupine they are there much finer and more bristle-like. White demi-collar barely indicated. The general colour is much as in the others, but a little more rufescent, and the spines are even more shining than usual; the white of the quills being also much purer than in either of its congeners. The body-colour pales remarkably on the hind-limbs. The ear-conch is formed most as in H. HIRSUTIROSTRIS, being somewhat squared above, with strongly marked posterior angle; and (in the specimen at least) they are much more scantily clad with hair than in H. BENGALENSIS and H. HODGSONII. Lastly, the pedunculated quills of the tail are considerably more elongated than in either of the other species. In the small well mounted specimen described, standing $5\frac{1}{2}$ in. high at the shoulder, some of the bristles forming the crest are 6 in. long: in a Bengal Porcupine of the same size, they are not $3\frac{1}{2}$ in.; but still appear conspicuously in the latter, from being all broadly and evenly tipped with white. It is not improbable that the large H. HIRSUTIROSTRIS may likewise prove to inhabit the same island; and likely enough there is a second and small species, perhaps H. ZEYLONENSIS, in S. India. The latter is described by Mr. Layard to be common in the Chilaw and Jaffna districts, doing great damage to the cocoa-nut trees when young and tender. The natives term them *Oat Oara* ('thorn pig').

The skulls of H. BENGALENSIS and H. ZEYLONENSIS remain to be examined and compared with those of H. HODGSONII and H. LONGICAUDA; for to the latter, and not to the two great Porcupines, these two small crested species are more immediately affined. The want of crest is accordingly no distinction of ACANTHION from HYSTRIX, as Mr. Gray would separate them; but the absence of the two great lateral masses of very long slender quills, impending the others and even the tail in the two large species, affords a better external distinction. We follow Mr. Waterhouse and others, however, in assigning the whole to *Hystrix*, as now limited.

LEPORIDÆ. The Hare of Ceylon is LEPUS NIGRICOLLIS, F. Cuv. (*L. melanauchen*, Tem.), identical with the species of peninsular India, Java, and the Mauritius, from each of which regions the Society possesses a specimen.*

* The Hare of Bengal and all Upper India is L. RUFICAUDATUS, Is. Geoffroy; Mr. Waterhouse erroneously supposing L. NIGRICOLLIS, F. Cuv., to be the Hare of Bengal. We know but of twelve species of *RODENTIA* in all Lower Bengal, which are as follow:—1. SCIURUS PALMARUM.—2. GERBILLUS INDICUS:—3. MUS INDICUS, Geoffroy (*M. kok*, Gray); common field Rat.—4. M. TERRICOLOR, nobis; common field and garden Mouse.—5. M. BANDICOTA, in marshy localities.—6. M. DECUMANUS.—7. M. RATTUS, observed only among the shipping in the river.—8. M. FLAVESCENS, chiefly in cocoa-nut trees and about bamboos.—9. M. NEMORALIS, trees.—10. M. MANEI, Gray; domestic Mouse.—11. HYSTRIX BENGALENSIS.—12. LEPUS RUFICAUDATUS.

We suspect that MUS OLERACEUS, Sykes, is also a Bengal animal; and the Society possesses a specimen from Asám quite similar to others from S. India. M. DUMETICOLA and M. POVENSIS, Hodgson, require to be carefully compared with it.

M. TERRICOLOR, nobis, must be closely affined to M. CERVICOLOR and M. STROPHIATUS, Hodgson. Mr. Elliot sent it from S. India together with M. LEPIDUS, from which he did not distinguish it. Indeed it much resembles that species in form and colour, but the face is very much shorter, and the fur short, soft, and not spinous in the least degree. Its colour varies, however, according to the soil; those of the alluvium of the Ganges being darker than specimens from the ferruginous soil to the westward. All have the under-parts white, abruptly separated from the hue of the upper-parts, as in the various affined species. Length $2\frac{1}{2}$ in.; of tail $2\frac{1}{8}$ in.; ears $\frac{1}{4}$ in.; hind-foot $\frac{9}{10}$ in. Inhabits gardens, and is very numerous in the open fields; together with GERBILLUS INDICUS and MUS INDICUS.

M. MANEI, Gray, who refers to this the *M. musculus* apud Elliot, is consequently the common house Mouse of India generally, which differs from M. MUSCULUS in having a longer tail, and shorter fur which is not so dark in colour.

Pachydermata. The Pachyderms of Ceylon are the Elephant, the wild Hog, and the Duyong; which last, according to Mr. Layard, is common in the Bay of Calpentya, on the western coast, and bears the name of *Talla Maha* among the natives, who highly esteem its flesh. A skull of a Cinghalese wild Boar, sent by Mr. Layard, differs much in contour from skulls of the wild Boar of India; indeed so much, that we feel justified in denominating it as a peculiar species—

Sus zeylonensis, nobis, *n. s.* Skull longer than that of the Indian Boar, nearly straight in profile, very much contracted at the vertex.* Palate contracting posteriorly to less than 1 in., from the magnitude of the last molar, which is considerably larger in both jaws than in

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Length of head and body 3 in., and of tail 3¼ in. M. dubius, M. homourus, and M. urbanus, Hodgson, require to be compared with it.

Here, too, may be indicated a remarkable species from Mergui (of which we possess an imperfect specimen) by the name M. Berdmorei. Length about a foot, of which the tail is not quite half. Ears posteriorly ⅜ in. Hind-foot 1⅛ in. Fur shortish, even, coarse and hispid, but not spinous, of one quality, with no long hairs intermixed: its colour grizzled grey above, unmixed with rufous; below and on the feet pure white. Rodential tusks white. Tail rather more copiously clad than usual with short hairs.

* There are two races, if not even species, of Indian Wild Boars, distinguished respectively by a broad and by a narrow vertex in specimens *of the same age*. In the former, the vertex, where narrowest, measures 2¼ in. wide; in the other barely 1⅜ in. In other respects they are similar, except that the molars are larger in the race with narrow vertex. This, so far as we have seen, is the Bengal animal; whereas that with broad vertex inhabits Kutak, and perhaps the Indian peninsula generally. A skull from Arakan exhibits an intermediate character, with vertex 1¾ in. wide, and the molars large. The Bengal Boar has long borne a reputation for higher courage than that of the Upper Provinces at least, which may depend upon its specifical distinctness. While so many affined species of Sus have been distinguished by the Dutch zoologists in the archipelago, it is not unlikely that a plurality of continental species may have remained undetected.

In Dr. Solomon Müller's figures of the skull of Sus verrucosus, the young but full grown animal is represented to have a broad vertical plane, which is excessively contracted in an old animal: but the oldest Indian skull of several now before us is one with the broad vertical plane.

Since writing the above, we find that Mr. Gray distinguishes a Boar skull from the Nilgiris by the name Sus affinis; while specimens from the Nepal "hills" and *Turai*, and one from Malabar, he designates Sus indicus. *List of the Osteological specimens in the collection of the British Museum.*

the wild Boar of India, the upper measuring $1\frac{3}{4}$ in. long, by $\frac{15}{16}$ in. broad anteriorly. Vertex narrowing to 1 in. only in breadth. Total length of skull, from vertex to tips of nasals, $16\frac{1}{4}$ in. Altogether, this skull approximates closely in contour to the figures of the skull of Sus BARBATUS by Dr. S. Müller and M. Temminck.

RUMINANTIA. CERVIDÆ. The "Elk" of Ceylon appears to be RUSA HIPPELAPHUS of India generally, vel *Cervus equinus*, F. Cuv., of the Malayan peninsula, Sumatra, and Borneo; found also in the intervening Burmese countries. AXIS MACULATUS is common: also MUNTJACUS VAGINALIS, of which the heads of both sexes were sent for identification by Dr. Kelaart. MEMINNA INDICA abounds*. Lastly, Dr. Kelaart informs us of the existence of a species affined to AXIS PORCINUS, and probably undescribed; living examples of which he has recently shipped for the London zoological gardens.†

* "The *Moschidæ*," writes Mr. H. N. Turner, jun. (*Ann. Mag. N. H.*, 2d series, VI, 482) "must, of course, be distinguished from the *Cervidæ* by their trilocular stomach, and by the presence of the gall bladder." We have never found the latter to exist, however, in the Chevrotains.

† These, we now learn, have arrived in London, and are considered to be distinct and new. We are also informed that the (so called) Hog Deer of the banks of the Indus (C. DODUR? Royle,) is distinct from the AXIS PORCINUS of Bengal, Nepal, Asám, Arakan, Tenasserim, &c.—While on the subject of Deer, it may be remarked that Mr. Gray, in his 'List of osteological specimens in the collection of the British Museum,' gives as distinct species of the Elaphine group "CERVUS CASHMIRENSIS, Falconer, MS.," and "CERVUS (WALLICHII?) AFFINIS" of Mr. Hodgson. We have little doubt that these will prove to be the same, and refer to figs. 8 and 9 of the plate accompanying *J. A. S.* X, 750, representing a horn of the Kashmir Stag, for comparison with Mr. Hodgson's various figures of those of C. AFFINIS (*J. A. S.* X, 722, XIX, 466,519). We continue to be, as formerly, of opinion that the species is CERVUS WALLICHII, Duvaucel, figured and described from a young animal at that time living in the Calcutta Botanic Garden, the identical pair of horns it bore being now in the Society's museum, and represented *J. A. S.* X, 750, pl., fig. 7. In all probability, it is also the *Irbisch*, or great Stag of Siberia, mentioned by Strahlenberg; if not likewise the Persian *Maral*, which we saw alive in London; and (as remarked on a former occasion, *J. A. S.* X, 747,) we "cannot doubt that, with full maturity, this noble species possesses a terminal crown to its antlers, assuming thus every feature of a typical member of the elaphine group;" the crown being, however, probably as in the Wapiti (C. CANADENSIS, vide X, 750, pl., figs. 4, 6), rather than as typically in the European Stag (C. ELAPHUS). The C. WALLICHII, as figured by Mons. F. Cuvier, most close-

Bovidæ. The wild Buffalo is common; and it would seem that formerly Bos gaurus inhabited the island, inasmuch as the *Guavera* of Knox can scarcely refer to aught else; but, if so, it has now been exterminated for nearly a century.

Edentata. Mr. Layard writes—"I think our island Manis is identical with the Indian M. brachyura, but it requires identification. It is not uncommon. I have also seen another species which I have little doubt will prove to be the long-tailed Pangolin of authors;" or can this be M. leptura, nobis, *J. A. S.* XI, 454, XVI, 1293?

Cetacea. The Dolphins and Porpoises of the coast, and the large Whales occasionally stranded, are all in need of accurate determination.

AVES.

Of Birds, Dr. Kelaart sent the following species worthy of remark:—

Palæornis Calthrapæ, Layard, Blyth, *J. A. S.* XVIII, 800, XIX, 334. "Common at Newera Elia and lower down" (Kelaart).

Scops Aldrovandi, rufous variety *(Sc. sunia,* Hodgson). Most probably this is the *Strix indica* vel *bakkamœna,* auct., from Ceylon.*

Spizaëtus nipalensis, Hodgson. Peculiar, so far as previously observed, to the Himalaya.

Harpactes fasciatus, (Pennant); *Trogon malabaricus,* Gould.

Caprimulgus Kelaarti, nobis, *n. s.* Both sexes of a species much resembling C. indicus, Latham, but smaller, and identical with the Nilgiri bird described in a note to *J. A. S.* XIV, 208: and the large specimen referred to on the same occasion, which we have now much reason to believe was either from the Philippines or China,† is doubtless also of a distinct race; the three differing much as C. albonotatus, C. macrourus, and C. atripennis, or C. ruficollis and C. indicus, C. monticolus and C. affinis. These three

ly resembles the Wapiti Stag of N. America; and the similitude of the horns (at least at a particular age?) is exhibited in figs. 2 and 8 of the plate referred to. Compare also the young Wallichii, fig. 7, with the young *Maral*, fig. 10.—Since the foregoing was in type, we have chanced to refer to the figure of the Wapiti in Dekay's volume on the Mammalia of the State of New York, and the horns represented in that figure are absolutely similar to those of the great Asiatic Stag, as the latter are given by Mr. Hodgson.

* The name *Bakka meena* is applied to the *Caprimulgi.*

† It formed part of the dispersed Macao museum.

species or races much resemble C. EUROPÆUS in their general aspect, but have plumed tarsi, and the males are marked with white on *four* of the outer tail-feathers on each side, and on the same number of the wing-primaries. The white on the tail-feathers is not quite terminal, as in C. EUROPÆUS, but has a narrow dark margin in C. INDICUS and C. KELAARTI, and a much broader dark margin in the other, reducing the space occupied by the white in the first two races: and the *ensemble* of the markings of C. KELAARTI presents a certain difference from that of C. INDICUS, readily enough appreciable by the eye, but which can scarcely be expressed adequately in language; further than that the pale portion of the plumage generally is more albescent and less tinged with rufous in C. KELAARTI, and thus contrasts more strongly with the black. The size, however, affords the readiest distinction; the length of wing in three specimens of C. KELAARTI ranging from $6\frac{7}{8}$ to $7\frac{1}{8}$ in., in five of C. INDICUS from $7\frac{5}{8}$ to $7\frac{7}{8}$ in., and in one of the Chinese (?) race $8\frac{1}{2}$ in.*

CYPSELUS MELBA, (L.) Inhabits also the N. W. Himalaya, Central and S. India.

CISSA PUELLA, nobis, *J. A. S.* XVIII, 810; *C. pyrrhocyanea*, (Wagler), Gould's 'Birds of Asia,' pt. 1. "This," writes Dr. Kelaart, "is perhaps the handsomest bird in Ceylon. It is rather numerous about Newera Elia, but I have not seen it in the low country."

GARRULAX CINEREIFRONS, Kelaart, *n. s.* Affined to G. DELESSERTI, (Jerdon, *Ill. Ind. Orn.* pl. 13), of the Nilgiris, but differing much in its colouring. General hue a rich brown above, much paler below; forehead and cheeks pure ashy; chin and borders of the outer primaries, albescent. Bill blackish. Legs dusky corneous. Length $8\frac{1}{2}$ in.; of wing $4\frac{1}{2}$ in.; and tail 4 in., its outermost feathers $1\frac{1}{8}$ in. less: bill to gape $1\frac{1}{4}$ in.: tarse $1\frac{1}{4}$ in.

ALCIPPE NIGRIFRONS, nobis, *J. A. S.* XVIII, 815. Young, similar in plumage to the adult.

CISTICOLA OMALURA, nobis, *Catal.* No. 822. Differs from C. CURSITANS, (Franklin), in having a stouter bill, the whole upper-parts much darker, and the tail sub-even, except that its outermost feathers

* Among numerous examples of C. INDICUS procured in Bengal and various other parts of India, the Malayan peninsula, &c., we have observed no difference worthy of notice here.

are ¼ in. shorter than the next. The prevailing hue of the upper-parts is dusky-black, with much narrower rufescent lateral margins to the feathers than in C. CURSITANS, the rump however being unmixed rufescent as in that species, and the neck much tinged with the same. One specimen has some dark markings on the breast; and another in first plumage greatly resembles the adults, and is conspicuously different from the young of C. CURSITANS. This species was long ago procured by Mr. Layard, and therefore is probably not peculiar to the mountains or their vicinity. From the whole of India we have only seen C. CURSITANS, which likewise inhabits Ceylon. Numerous African species of this genus have however been figured and described by Dr. Rüppell and Dr. Andrew Smith, and five Australian species by Mr. Gould (whose C. RUFICEPS we take to be merely the young of his C. ISURA). From DRYMOICA they differ structurally in having twelve tail-feathers instead of ten only.

MERULA WARDII, Jerdon. Both sexes of this species are sent, the female being the *Oreocincla micropus* of Mr. Hodgson.

M. KINNISII, Kelaart, *n. s.* The Blackbird of Newera Elia. Female, above ashy-black, below rather paler; bill and feet bright yellow. Length about 9 in., of wing 4½ in., and tail 4 in.; bill to gape 1⅛ in.; and tarse the same. 1st short primary 1¼ in. shorter, and 2d ½ in. shorter, than the 4th. The last character distinguishes this species readily from M. SIMILLIMA and M. NIGROPILEUS of S. India; as also from M. BRACHYPUS, nobis (*J. A. S.* XVI, 148), likewise of S. India, but which appears to be Latham's 'Black-crowned Thrush,' from Ceylon. The wings are even more rounded than in M. VULGARIS; and the species would seem to be closely affined to M. XANTHOSCELIS, (Jardine, *Contrib. Orn.*, 1848,) from Tobago. "The male," writes Dr. Kelaart, "is blacker and more glossy. In notes and habits resembling M. VULGARIS."

PRATINCOLA ATRATA, Kelaart, *n. s.* The 'Robin' of Newera Elia. Both sexes similar to those of PR. CAPRATA, except that they are much larger, with a proportionally rather stouter bill; and the female is much less rufescent. Wing 3¼ in. in the male; 3 in. in the female. "Notes and habits very like those of the English Robin" (Kelaart). PR. CAPRATA inhabits the less elevated parts of the island.

Hirundo domicola, Jerdon; *H. javanica* apud Latham and Shaw. 'Bungalow Swallow' of residents in the Nilgiris.

Corydalla striolata, nobis, *J. A. S.* XVI, 435.

Munia pectoralis, (? Jerdon), adult. This species was once only obtained by Mr. Jerdon in S. India, and his specimen (which is in the Society's museum) would now seem to be a young bird. What appears to be the adult is brown above, with pale stems to the feathers, nearly obsolete on the back; and passing to blackish on the forehead, wings, rump, and tail: throat and fore-neck, with the cheeks, deep brown-black: the smaller upper tail-coverts are variegated with white, and the longer are largely tipped with fulvous: under-parts variegated; the breast brown, and belly and lower tail-coverts black, the last having white medial streaks, and the rest of the under-parts white subterminal bands, and the flank-feathers a second and some of them a third white cross-band additionally. Beak livid bluish; and feet dark plumbeous. Length of wing $2\frac{3}{16}$ in.; tail $1\frac{3}{4}$ in.; beak from frontal angle $\frac{9}{16}$ in.

Pycnonotus penicillatus, Kelaart, *n. s.*: *Yellow-eared Bulbul* (?), Jerdon, *Madras Journ.* XIII, 168. Bright olive-green above, yellow below: crown and cheeks black, passing to pure ashy on the ear-coverts; the chin, feathers at the angle of the lower mandible, and somewhat elongated loral tuft pointing upwards, white; above the eye, also, a white spot, and below it a yellow one,—and proceeding backward from the eye, above, is a lengthened tuft of bright yellow, silky, pointed feathers: no white marks on the tail. Bill black; and feet blackish. Length about 7 in., of wing $3\frac{1}{4}$ in., and tail 3 in.; bill to gape $\frac{13}{16}$ in.; and tarse $\frac{7}{8}$ in. Peculiar to the mountain region.

Brachypteryx (?) Palliseri, Kelaart, *n. s.* Female? A rich dark olive or somewhat tawny brown above, paler below, and whitish along the middle of the abdomen; flanks and lower tail-coverts dark; and a strong rufous tinge on the chin and throat. Bill dusky above, whitish beneath. Feet brown. Length about $6\frac{1}{2}$ in., of wing $2\frac{1}{2}$ in., and tail $2\frac{3}{4}$ in.: bill to gape $\frac{13}{16}$ in.; tarse 1 in. The 5th, 6th, and 7th primaries equal and longest, the 1st 1 in. shorter; and the outermost tail-feather $1\frac{3}{8}$ in. shorter than the middle ones.

Palumbus Elphinstonei (?, Sykes), var.? This bird is so closely affined to the Nilgiri race, that we do not venture to separate it, however strongly distinguished in its colouring; quite as much so, for

instance, as Turtur risorius *(ferus)*, T. vinaceus, and T. bitorquatus, or T. orientalis and T. auritus. It differs from the Nilgiri race in having the back and wings plain dark slaty, without a trace of ruddy margining to the feathers; the head, neck, and underparts are also tinged with vinaceous more than with green, and the reddish-purple gloss—especially about the lower part of the neck behind, where it contrasts *abruptly* with the ashy of the back,—is considerably more brilliant. It is altogether a handsomer bird than that of the Nilgiris. "The habits of this Pigeon," writes Dr. Kelaart, "are strictly arboreal; it flies high and swiftly. It comes to Newera Elia to breed; and I have seen a nest with only one egg, as large as that of the domestic Pigeon. The stomach contained fruits of the *Nelon*" (?) "Sexes nearly alike."

Dr. Kelaart further writes, from Newera Elia—"Among other birds, I have found here the Collocalia brevirostris" (seut), Cuculus micropterus, Gallus Stanleyi, Galloperdix zeylonensis, Athene castanotus, and Pericrocotus flammeus, &c.; a little lower down, the Gracula ptilogenys and Gr. religiosa; and about 1000 ft. below Newera Elia, the Hypsipetes nilgiriensis."

The following species of birds are peculiar (so far as at present known) to the island of Ceylon.

Palæornis calthrapæ, Layard, *J. A. S.* XVIII, 800, XIX, 334.

Loriculus asiaticus, (Latham), *J. A. S.* XVIII, 801.

Buceros violaceus, Wagler *(non vidimus)*, *J. A. S.* XVIII, 803.

Picus gymnopthalmos, nobis, *J. A. S.* XVIII, 804.

Brachypternus ceylonus, (Forster).

Br. (?) rubescens, Vieillot *(non vidimus)*.

Megalaima flavifrons, (Cuvier).

M. rubricapilla, (Gmelin).

Centropus chlororhynchos, nobis, *J. A. S.* XVIII, 805.

Phœnicophaus pyrrhocephalus, (Forster).

Batrachostomus moniliger, Layard, nobis, *J. A. S.* XVIII, 806.

Cissa puella, nobis, *J. A. S.* XVIII, 810.

Gracula ptilogenys, nobis, *J. A. S.* XV, 285.

Garrulax cinereifrons, nobis, *ante*.

Malacocercus striatus, Sw.; if really distinct from M. bengalensis, (Brisson).

M. rufescens, nobis, *J. A. S.* XVI, 453.

Drymoica valida; *Dr. robusta*,* nobis, *J. A. S.* XVIII, 812.

Cisticola omalura, nobis, *ante*.

Pomatorhinus melanurus, nobis, *J. A. S.* XVI, 451.

Alcippe nigrifrons, nobis, *J. A. S.* XVIII, 815.

Drymocataphus fuscocapillus, nobis, *ibid.*

Oreocincla spiloptera, nobis, *J. A. S.* XVI, 142.

Merula kinnisii, Kelaart, nobis, *ante*.

Pratincola atrata, Kelaart, nobis, *ante*.

Brachypteryx (?) Palliseri, Kelaart, nobis, *ante*.

Hirundo hyperythra, Layard, nobis, *J. A. S.* XVIII, 814.

Tephrodornis affinis, nobis, *J. A. S.* XVI, 473.

Dicrurus edoliformis, nobis, *J. A. S.* XV, 297.

D. leucopygialis, nobis, *J. A. S.* XV, 298.

Pycnonotus penicillatus, Kelaart, nobis, *ante*.

P. nigricapillus, (Drapiez).†

* Pre-occupied by another species described by Dr. Rüppell. Again, Malurus gracilis, Rüppell, *Atlas*, is a Drymoica very closely affined to, if not identical with, our Dr. lepida, *J. A. S.* XIII, 376, XVI, 460. The name Prinia gracilis, Franklin, subsequently bestowed to Malurus gracilis, Rüppell, will nevertheless stand, as this refers to a true Prinia as distinguished from Drymoica. Prinia rufifrons, Franklin, on the other hand, is a Drymoica; and the specific name claims precedence over Pr. rufifrons, Rüppell, *Neue Wirbel.*, which is another Drymoica, and may now bear the name of Dr. Rüppelli, nobis. Of ten Arabian and N. African species at present assigned to Drymoica by Dr. Rüppell, those named by him clamans, gracilis, rufifrons, mystacea, and robusta are true Drymoicæ,—pulchella is a Prinia,—and lugubris, erythrogenis, and seemingly inquieta and ruficeps, are Cisticolæ. The species of the last named group have constantly twelve *rectrices*, whereas those of the two former have but ten. Another Indian type, Malacocercus, is represented in N. Africa by the Malurus acaciæ, M. squamiceps, and Crateropus rubiginosus, of Rüppell, and in S. Africa by Cr. Jardinii, A. Smith. The Cr. leucocephalus, Cr. leucopygius, and Cr. plebeius, Rüppell, appertain to a distinct African type which is unknown in India.

† *Sylvia nigricapilla*, Drapiez, v. *Ægithina atricapilla*, Vieillot, founded on Levaillant, *Ois. d'Afr.*, pl. 140; *Rubigula aberrans*, nobis, *J. A. S.* XV, 287, XVI, 472. Vieillot's name has the priority, but his *Muscicapa atricapilla* refers

Treron pompadora, (Latham). *Non vidimus.* In need of identification, and supposed by Mr. Strickland to be the same as *Tr. malabarica*, Jerdon.

Gallus Stanleyi, Gray: *G. Lafayettei*, Lesson; *G. lineatus*, nobis.

Galloperdix zeylonensis, (Gmelin): *Tetrao bicalcaratus*, Pennant.

Others are doubtfully distinct, as Megalaima zeylanica from M. caniceps of S. India;* Leucocerca compressirostris (*J. A. S.* XVIII, 815,) from L. albofrontata; and we might here have placed Malacocercus striatus as doubtfully distinct from M. bengalensis, Dicrurus leucopygialis from D. cærulescens, and Pomatorhinus melanura from P. Horsfieldi: Corvus splendens and Acridotheres tristis are of a much darker hue in Ceylon than in Bengal and in N. India; so is Micropternus gularis of Ceylon as compared with the bird of S. India. Hypsipetes nilgiriensis is, on the contrary, paler in Ceylon, and more like the Himalayan H. psaroides. Acrocephalus dumetorum (XVIII, 815,) has, in Ceylon, a distinguishing greenish shade. The difference of Palumbus Elphinstonii of Ceylon from that of the Nilgiris has already been indicated: and, lastly, Oriolus melanocephalus of Malabar and Ceylon may constantly be distinguished from that of Bengal, Nepal, Asám, &c., by the markings of the wings, as especially the quantity of yellow at the tips of the tertiaries; this being much more developed in the Bengal race, in which it occupies the whole outer web of the shorter first and second tertiaries, and about $\frac{3}{4}$ in. of the outer webs of the two next; whereas in the Ceylon and Malabar race it forms merely a series of small terminal spot to the tertiaries: the yellow tips of the coverts of the primaries are also constantly reduced in size in O. melanocephalus of Malabar and Ceylon.

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to another species of the same genus, which is *Hæmatornis chrysorrhoides*, Lafresnaye (*Rev. Zool.* &c., 1845, p. 367), a Chinese species, different from *P. hæmorrhous*, (Gm.), with which Dr. Hartlaub supposed it identical in *Rev. Zool.* &c., 1846, p. 4. For description of P. atricapillus, (Vieillot), vide *J. A. S.* XIV, note to p. 569.

* M. caniceps of Central and N. W. India is constantly larger, with the throat less dark in colour.

Note.—Since the foregoing sheets were sent to press, we have received from Dr. Kelaart, a printed "Catalogue of Ceylon Mammalia, with descriptions of new species," recently published in the 'Journal of the Royal Asiatic Society of Ceylon.' This will necessitate a few changes of nomenclature.

Presbytis ursinus, nobis (p. 155), he designates as Pr. cephalopterus, var. b, *monticolus;* and the native name he spells *Kalloo Wanderoo,*—that of Pr. thersites he now gives as *Ellee Wanderoo,*—and of Pr. priamus as *Kondé Wanderoo.* He further mentions *(in epistolâ)* another mountain race, by the name Pr. albinus, Kelaart, *n. s.* "All white, with a dash of grey on the head; face and ears black; palms and soles flesh-coloured. Rare: seen about Kandy in parties of three or four. We have accordingly now six species of Simiadæ in Ceylon, reckoning as one the mountain representative of Pr. cephalopterus."

Of Pr. ursinus, he remarks,—"They are usually seen in large numbers jumping on the trees, and when disturbed make a peculiar short howling noise. One was known to have attacked a cooly on a coffee estate carrying a rice-bag. The Malabars eat the flesh of this Monkey, and consider it very delicious food; and some Europeans who have tasted it are of the same opinion.

"Pr. priamus is not confined to the low country in the north. They are seen skirting the Kandyan hills and occasionally on the hills. This place (Trincomali) is full of them; but as yet I have not seen the Pr. thersites. It is found lower down in Bintenne, and in the Wanny district." *MS.*

Pteropus Leschenaultii, apud nos (p. 155), is described by the name *Pt. seminudus,* Kelaart, *n. s.*

Two species are assigned to the restricted genus Rhinolophus. One—Rh. fulvidus, Kelaart,—affined in colouring to Hipposideros fulvus, Gray,—is thus described.

"Rh. rubidus, Kelaart, *n. s.* Head and body of a deep orange-red colour. Membrane pale brown. Interfemoral membrane enclosing the whole tail, and the free edge running almost in a straight line rounded off near the tail. Length of head and body 1½ in.; tail ¾ in.; expanse 8 in. I am unable," adds Dr. Kelaart, "to give a description

of the complicated nasal processes, as all the specimens received were dried and imperfectly preserved. This beautiful Bat is seen at Kadoogavana (2000 feet), only for a few days in the month of August."

The other he does not name, but describes as follows:

"Rh.—*n. s.?* Rufescent-brown—face slightly fulvous. Round the ear and on the sides of the posterior half of the body bright fulvous. Tail enclosed in the interfemoral membrane. Head and body $2\frac{1}{2}$ in.; tail 1 in.; expanse 11 in. Only one dried specimen, procured by my brother from Kadoogavana—none seen since."

Of Hipposideros, Dr. Kelaart gives three species in his catalogue, viz.

"H. lankadiva, Kelaart, *n. s.** Length, of a full grown male, head and body $4\frac{3}{12}$ in.; tail 2 in.; fore-arm 3 in.; tibia $1\frac{1}{2}$ in.; carpus $1\frac{3}{4}$ in.; tarsus $\frac{4}{12}$ in. Ears $\frac{10}{12}$ in. broad, and nearly as long; space between them $\frac{3}{4}$ in. Weight 2 oz. $3\frac{1}{2}$ dr. Ears large, acuminate, and emarginated externally near apex; with transverse striæ on their inner surface; naked, with the exception of the inner edge. Muzzle short, but face rather elongated. Body long, covered with soft dusky rufous-brown fur, which is greyish at base. Head, neck and beneath, of a lighter brown colour: pubis hairy. Interfemoral membrane acuminated to tip of tail, which is not exserted. No frontal sac, but two tubercular points from which grow stiffish hairs. This Bat is found in great abundance in and about Kandy. I have seen several from the Kornegalle Tunnel, which swarms with them. It is the largest of all the Rhinolophinæ hitherto seen in Ceylon."

The other two are described as H. Templetonii, Kelaart, (*Rh. voulha*, Templeton†), which is no other than H. speoris,—and H. atratus, Kelaart (*Rh. ater*, Templeton), which is the supposed variety of H. murinus noticed in p. 157. Besides the latter, as before stated (p. 156), Dr. Kelaart forwarded to Calcutta a specimen of what we presume to be H. vulgaris, (Horsfield), apud Gray, of India,—and one of indubitable H. murinus, (Elliot). We accordingly recognise

* No doubt this is the dubiously cited Rh. insignis of Mr. Waterhouse's Catalogue,—insignis being a true Hipposideros, while pusillus is a restricted Rhinolophus, and the latter therefore cannot be the small Indian Hipposideros noticed in p. 156.

† "*Voulha* is a very vague term for a species of Bat, as it is the Cinghalese word applied to all Bats."—Kelaart.

the following as Cinghalese species of HIPPOSIDEROS.—1. H. LANKADIVA (v. *insignis?*).—2. H. VULGARIS?—3. H. SPEORIS (v. *voulha*).—4. H. MURINUS.—5.? H. MURINUS, var? (v. *ater et atratus*).

Of NYCTICEJUS, Dr. Kelaart only gives N. HEATHII and N. ISABELLINUS, nobis, *MS.*, which latter is N. TICKELLI, nobis, described p. 157, *ante*.

The four species of HERPESTES are given as H. VITTICOLLIS, H. GRISEUS, H. FLAVIDENS *(n. s.)*, and H. RUBIGINOSUS *(n. s.)*; and the two latter, he adds, "may turn out to be two new species discovered by Mr. Elliot." They are thus described:—

"H. FLAVIDENS, Kelaart, *n. s.* Yellowish-brown. Hair annulated with brown and yellow rings, tips yellow. Tip of tail reddish. Muzzle blackish. Face brown, slightly ferruginous. Ears fulvous, thickly clothed with hair. Feet blackish. Soles $\frac{3}{4}$ bald. A full grown specimen obtained at Kandy measured as follows: Length of head and body $16\frac{1}{2}$ in.; tail $12\frac{1}{4}$ in.; sole 3 in.; palm $1\frac{3}{4}$ in.; * * * This species was supposed hitherto to be only a variety of H. GRISEUS, but there are strong characteristic differences between the two: the golden-yellow rings and tips of hair are very marked. Generally found in the higher parts of the island. I obtained one of a very deep brown and yellow colour from Newera Elia.

"H. RUBIGINOSUS, Kelaart, *n. s. Deeta*, Cingh. Nearly as large as H. VITTICOLLIS. Reddish and ferruginous brown. More of the red on the head and outer sides of legs. Hair, annulated black and white and terminating in long reddish points. Muzzle flesh-coloured. Sides of nose and circle around the eyes of a light rusty colour. Feet black. Tip of tail black.—I am indebted to my friend M. Casie Chitty, District Judge of Chilow, for a live specimen of this animal, among several others which he very kindly placed at my disposal." Whatever the former may be, that here described would seem to be identical with H. ELLIOTI, note to p. 162, *ante*.

The dark variety of PARADOXURUS ZEYLONICUS, formerly termed by Dr. Kelaart *P. montanus*, he now describes as P. ZEYLONICUS, var. *fuscus*. "Beetle-brown throughout. No streaks on the back perceptible. Fur very glossy; tail with a bright golden-yellow subterminal ring. Newera Elia."

Four Shrews are enumerated by the names SOREX MURINUS, S. MONTANUS, Kelaart, (p. 163, *ante*), S. FEROCULUS, Kelaart, (*S. macropus*, nobis, p. 163, *ante*), and S. FERRUGINEUS, Kelaart, described as follows:—

"Fur soft, ferruginous-brown washed with blue; smaller than the S. MONTANUS; feet and legs naked. Large secreting glands on the pubis—odour very disagreeable. No cetæ or" [misprint for *sebaceous?*] "glands could be traced on the other two species, nor had they any of the smell." From this last remark, we infer that S. MONTANUS et S. FERRUGINEUS of Dr. Kelaart are brought together under the name MONTANUS in p. 163, *ante*. If so, we still think them to be identical.

With reference to the "large black Shrew" mentioned in p. 164, *ante*, Dr. Kelaart adds: "There are two other and larger black Shrews than any of those now described—one in the possession of Mr. Thwaites of Peradenia,—and the other has a very powerful musky odour, stronger even than in S. MURINUS,—occasionally seen in the godowns at Kandy,—of which further notice hereafter." *In epistolâ* he further remarks, "there is also a TUPAIA, I think."

Of MURIDÆ, Dr. Kelaart's MUS ARBOREUS, Buch. Ham. *MS.*, is M. NEMORALIS, nobis, p. 168, *ante*;—M. DUBIUS, Kelaart, is most probably M. INDICUS, Geoffroy, apud nos, p. 167, *ante*; M. TETRAGONURUS, Kelaart, we take to be M. RUFESCENS, Gray; M. MUSCULUS apud Kelaart, to be M. MANEI; and M. ASIATICUS, Gray, apud Kelaart, ("Paddy-field Rat,") is undescribed.

Of Porcupines, he writes *(in epistolâ)*: "I am quite certain of HYSTRIX LEUCURA, Sykes, (v. HIRSUTIROSTRIS). I have compared it with Waterhouse's description, and it quite corresponds; so that H. ZEYLONENSIS makes a second species of the genus in Ceylon." He terms it *Heetava*.

Lastly, of the genus SUS, Dr. Kelaart writes *(in epistolâ)*: "I am inclined to think that there are two species or varieties in the island: the Newera Elia boar, and the low country S. ZEYLONENSIS. I will send you skulls, &c."

These annotations are necessary to place Dr. Kelaart's paper *en rapport* with the present article.—*E. B.*

Floods in India of 1849.—*By* Dr. George Buist, *Bombay*.

The rainy season of 1849 was one of the most remarkable that has occurred in India within the present century. On the Western Ghauts no rain fell in May, and but little in June, and it was not till near the middle of July, or full six weeks after the usual time, that the fall became general: indeed, famine from extreme drought was apprehended till near the close of the month. On the 22nd, 23rd and 24th of June, a violent atmospheric commotion occurred all over the country. On the second of these days the barometer fell almost unprecedentedly low at Calcutta, Madras, Lucknow, Hoshungabad, Trevandrum, Bombay, Kurrachee, and Aden, the first and last two places being 3000 miles apart; and we presume at all the intermediate stations, though from those named alone, returns have been received. The depression of the mercury was infinitely greater than could have been looked for from the amount of storm which followed. At Aden and at Kurachee rain seemed long promised, but none fell. A severe gale swept the upper part of the Bay of Bengal, extending to Arracan and Madras. The ships *Cabrass* and *Victoria* were lost in it, and many others endangered: the ship *Lord Dufferin* lost her helm, and was in great danger, on leaving Bombay Harbour. On this occasion violent rain fell in the Jullunder Doab, along the line of the Chenab and Jhelum, at Simla, Delhi, Agra, and Meerut. At Broach eight inches fell in as many hours, and the fall seems to have extended all over India. From this date, the barometer began suddenly and steadily to rise: on the 25th it had reached 29.722 at Calcutta, and on the 27th 29.716 at Bombay, having all at once sprung up nearly half an inch in two days at the former place, and above a third at the latter.

At this time plentiful showers occurred round Benares and Ghazeepore, when it cleared up altogether for a couple of months, to the great detriment of the country.

At Calcutta three inches of rain fell on the 27th, and 2.40 inches on the 1st, and again on the 9th July, rain and fair weather prevailing day about. For eleven days on end, not a drop seems to have fallen at Calcutta, and from the 9th to the 25th only two days of rain occurred, when 1.80 inches fell.

The rains at Calcutta had, notwithstanding, up to this time fully reached their average, and there had been no month since the com-

mencement of the year without showers. The quantity that had fallen during the first Monsoon months, was in all 34.28—fall for May 7.44, June 14.40, July 12.24. The total fall for the year had been 40.67—that of 1848 up to 1st August 38.96—the total fall at Calcutta last year was 58.69.

During the first fortnight of the month we had at Bombay seven days wholly fair—on the other seven the rains were very light. On the 16th and 17th, we had heavy falls which now continued with little intermission. While a plentiful supply of rain was thus being provided for the Malabar Coast as far North as Guzerat, all along the Ghauts, around Sholapore, and over a great part of Candeish,—only a few showers had occurred over the Deckan. At Ahmedabad so late as the 27th July, a famine was apprehended: Kurbee, which sold last season at 60 bundles, was selling for 16 to the rupee. The Saugor and Nerbudda Territories were suffering still, most severely. Around Deesa and along Mount Aboo by Sehore, Ajmere and Nusseerabad, and all over Rajpootana,—at Delhi, Meerut, Agra, all along the North West Provinces,—such was the deficiency that a terrible scarcity and famine was apprehended. The barometer stood high, and the heat was excessive; and though there seemed frequent promises, there was no actual fall of rain worth notice anywhere. On the 22nd the first threatenings made their appearance. A hurricane swept the Jullunder Doab, carrying every thing before it. A similar gale levelled the barracks of H. M.'s 32nd with the ground: a kindred one destroyed the barracks at Ghazeepore. Heavy rain fell at Meerut, but did not reach Delhi, though it raged all around. A severe thunder-storm with rain occurred at Poona, and heavy showers fell at Ahmedabad: it poured in torrents at Bolarum. On the 25th, a tremendous burst occurred all over India. At Bombay, where it had been raining heavily before, the unprecedented fall of nearly a foot occurred, and sixteen inches fell in three days. An Arab ship was dismasted half way across from Muscat. A heavy fall occurred at Poona, and all over the Deckan, at Sholapore, Ahmednugger, Surat, Ahmedabad, Agra, Meerut, and Delhi,—reviving the hopes of the husbandmant, and substituting the prospect of plenty for the apprehension of wan, On the 25th and 26th, it rained and blew violently at Phoonda Ghát,

the Barometer falling to 27.924; the lowest it had been during the season. In the course of four days, 26 inches of rain fell at the Ghaut: in the same time above 40 fell at Mahábáleshwar.

Violent rains occurred over the Southern part of the Chinese Empire in May and June: up to the middle of July the fall was heavy, and the Barometer low. On the 26th July, one of the most furious storms of rain and hail ever known occurred over the south of England.

Even with the limited information we possess, a multitude of singular facts are here disclosed to us, one of the most striking of which is the diversity in the state of the air in matter of humidity, when the rains were at their wildest. Taking the crisis of the 22nd June as an example we find the wet and dry bulb thermometers to have stood as follows at their maxima and minima at the following places:

	Bombay.		*Madras.*		*Aden.*		*Kurrachee.*		*Trevandrum.*		*Hoshungabad.*	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Dry, ..	84	81	97	83	95	87	93	83	83	76	79	No return.
Wet, ..	81	78	78	75	76	78	84	80	80	75	77	No return.
Difference,	3	3	19	8	19	9	9	3	3	1	2	——

Then we have the air at Madras in the midst of frequent rain, though not the rainy season, nearly as dry as it is with us during the fair weather; while at Aden, June seems the driest, January one of the wettest months of the year. This is one of the most important conditions of climate:—observations with the wet bulb are almost as easily made, as with the dry-bulb thermometer—they ought on no account ever to be omitted.

The following rain returns will show the amount of fall, in inches, for May, June, and July on this side of India.

	Bombay.	*Poona.*	*Surat.*	*Nassick.*	*Asseergurh.*	*Ahmedabad.*	*Phoonda Ghaut.*	*Mahabaleshwar.*	*Panchgunny.*
May,	——	0.405	——	——	0.23	2.03	——	——	——
June,	22.80	9.055	11.16	8.63	5.45	4.16	50.00	59.90	——
July,	51.60	6 425	19.00	7.03	16.31	7.62	83.00	89.24	——
Total,	74.40	15.885	30.16	15.66	21.99	13.75	133.00	149.14	11.95*

At Calcutta the fall in April, was 1.25; May 6.00; June 13.00; July up to 24th, our latest returns, 8.25. Total 28.50.

* Up to 15th July.

Hail-storms usually occur in our dry—most frequently in our hot weather in India: the most severe hail-storm yet recorded for the year 1849, was that at Jaulnah on the 15th January, though many of much severity happened all over Lower Bengal in the months of April and May. Those of the 3rd of the month last named prevailed all over India, from Ootacamund to Peshawar. A very severe hail storm occurred at Bassein on the 2nd June. The Malwa hail-storm of the 6th and 7th June, was unusually late for the season. We now find heavy hail falling at Mahábáleshwar for three days on end, on the 27th, 28th and 29th July—during the very wettest of the season—without thunder or lightning or storm.

These results have been thrown together with a view of conveying all the information that can be collected from all parts of India over the heaviest of the rainy season: and imperfect as they are, compared to what they might readily be made, we venture to say that a much larger amount of information has been conveyed by them than is to be found in any single paper or in any similar space. Papers on similar subjects are now issued by the Greenwich Observatory, quarterly, like the Chancellor's Accounts; and the Government of India would be conferring a service on the public were the example set at home to be copied by them.

The season along the North West Frontier from this time forward presented the most anomalous results. On the 3rd August the rain fell with the utmost violence all along the Malabar Coast, and another period of unusual and general disturbance now made its appearance just before the final drawing off of the rains—for at Bombay, on the 4th, just as the moon had attained its full, the barometer suddenly rose by a quarter of an inch in thirty-six hours' time—the weather became showery and open: this state of matters extending at least a hundred miles into the interior. On the 3rd a severe storm occurred off the mouths of the Ganges, in which a large vessel belonging to the king of Burmah was lost. The next full moon and the weather all over the country was changed. On the 17th of August there seems to have been a general fall of rain all over the country, though much more moderate in amount, than many of those which had previously occurred.

On the 27th July, violent rain began to fall at Simla, and so continued almost without cessation up to the 7th August. On the 29th,

heavy rain fell at Wuzeerábád and Lahore. At Delhi and so on to Benares after the first down-pour, the rains became light and irregular: at Almorah, during the first four days of August, a very heavy fall occurred. At Allahabad scarcely a shower fell betwixt the 24th June and 4th August, when on the 5th, a tremendous down-pour occurred, and so continued till the 15th.

Up to the middle of August scarcely a drop had fallen since the end of June and commencement of July, and the crops were completely burnt up: the river Bheema was nearly dry, and at Jaunpore the cultivators were endeavouring to keep their cattle alive with sugarcane. While abundance of moisture was making its appearance on every side, at Ferozepore, and all along to the S. E. branch of the Sutlej, a few casual showers were all that had occurred, the fear of famine beginning to become universal. Around Lahore and Mooltan, and so by the banks of the rivers, the country was completely inundated; while at Ferozepore the drought continued fierce and unmitigated. At Kurrachee, in Lower Scinde, where rain rarely ever falls, a heavy shower fell, and some thunder occurred on the 4th August, and again on the 16th, the whole month of July having been thick and cloudy, with a few drops of fall every now and then.

The month of August was generally open all over the country—from the 17th, indeed, along the Western Seaboard, the Monsoon appeared to have been over, when on the 1st September it rained with double fury, no less than ten inches having fallen at Bombay, in the course of the week—betwixt 20 and 30 inches fell on the Seaboard, and considerably above double this on the mountains in the course of the month—the fall along the Lowlands having been betwixt 130 and 150 for the Monsoon or double the average. On the Eastern Coast again from Lat. 15° S. showers fell during the season, usually fair with them, the dry weather on the Coromandel Coast corresponding with the rains in June, July, August and September in the other parts of India—their own rainy season in November, December and January, was one of the most deficient ever known within the Madras Presidency.

At the beginning, and again near the middle of August, a tremendous fall appears to have occurred along the range of mountains bordering the Western and North Western Frontier of the Punjab: the Indus, Jhelum, Chenab and Ravee, came down in irresistible fury, and burst

through all their borders, deluging the country as they went. On the 3rd of August the cantonments of Wuzeerabad on the Chenab were entirely flooded, and the troops required to be moved. This however was a trifling matter in comparison to what followed a fortnight afterwards. A tremendous fall occurred in the mountains of Cashmere, from which the Jhelum draws its waters. The inundation which followed deluged the plains below the salt-range. At Pind Dadun Khan, the Government salt stores were washed away—at Shahpore, a little further down, the cantonments were swept away, and the troops compelled to withdraw to a distance of five miles. The flood gathered force as it advanced by a heavy fall of rain, about four inches having been measured in the course of the night, betwixt the 15th and 16th at the usually dry station of Mooltan. About 80 miles above this the river burst through all its embankments, and laid the whole country under water, the bastions, outworks and other works of Mooltan, which a year before had for four months defied all the efforts of our Artillery, melted into the flood. On the 16th, three magnificent domes fell, and at 7 on the morning of the 17th, the enormous cupola of the Bahawul Huk came thundering to the ground, with a noise like the explosion of a stupendous mine. The whole structures were built of unburnt bricks. No such flood had been known to occur. The effects of the deluge were felt at Sukkur, and all down the course of the Indus.

The burst of rain during the first two weeks of September occasioned a second series of floods further to the South. The town of Cambay was completely inundated by the flooding of the Mahi on the 19th, in conjunction with a tide of almost unprecedented height: seventy houses fell, hundreds of others sustained most serious damage. To the South of Surat, no river of any size finds its way to the Western Ocean, though the vast streams which discharge themselves in the Bay of Bengal have their sources in the Ghauts close by, and are of course affected by the Western Rains. On the 10th the Godavery rose in the Nizam's dominions to an unusual height: the river Moosa which takes its rise to the westward of Hydrabad, swollen by the rains which had prevailed for a fortnight all over the country, burst through all its banks. On the 12th it burst into the city, washing down the walls, levelling the houses, and destroying the neighbouring cantonments. A rise of a few feet more would have choked up the bridges,

and most likely have carried them away. The torrent was awful,—it was an immense resistless mass of turbulent water threatening to engulf everything within its reach. It was a beautiful sight to see so slender a fabric as the bridge built by Major Cladpole spanning the flood: the waves, like huge giants, rushing forward to lash its sides. The water rushed to within six feet of the arch, but did no harm. The freshes visited Coringa at the debouchure of the river and nearly inundated the town. The house of the Collector, the highest in the place, was three feet under water—all the rest were submerged. The loss of property was immense.

Remarks on Showers of Sand in the Chinese Plain. By D. J. Macgowan, M. D.

From the Chinese Repertory.

The phenomenon of falling sand is occasionally observed through a great extent, if not the entire portion of the vast Plain of China. It is of such frequent occurrence that the Chinese regard it with no more surprise than they do the flitting meteor. Probably no year passes without several of these showers, though frequently so minute as to escape general observation. Perhaps as often as once in three years they are very heavy, but it is seldom that sand falls in such a large quantity as it did during the last shower. The phenomenon was witnessed three times during the present year, within a period of five weeks; the last and greatest commenced on the 26th of March, and continued four days without intermission, varying however in intensity. The wind blew from the north, northeast, and northwest, frequently shifting between these points, and varying in strength from a perfect calm to a brisk breeze. The altitude of the barometer was from 29.40, to 30.00 (rather lower than before and after the shower). The thermometer ranged from 36° to 81° F. No rain had fallen for six weeks, and the hygrometric state of the atmosphere was very high. Neither cloud, fog, nor mist obscured the heavens, yet the sun and moon were scarcely visible, the orb of day appeared as if viewed through a smoked glass, the whole sky presenting a uniform, rusty hue. At times this sameness was disturbed, exhibiting between the

spectator and the sun the appearance of a water-spout, owing to the gyratory motions of the impalpable mineral. The sand penetrated the most secluded apartments; furniture wiped in the morning would be so covered with it in the afternoon, that one could write on it legibly. In the streets it was annoying, entering the eyes, nostrils and mouth, and grating under the teeth. My ophthalmic patients generally suffered a relapse, and an unusual number of new cases soon after presented. Were such heavy sand storms of frequent occurrence, diseases of the visual organs would prevail to a destructive extent. The effect was the same when observed from the Ningpo Tower, and from the summit of the low mountains in the neighbourhood of the city.

The specimens I gathered fell on a newspaper placed on the roof of a house. The whole quantity which fell was about ten grains to the square foot. It should be remarked, however, that during the four days, the dust seemed suspended in the air for several hours at a time, scarcely an appreciable quantity falling during these intervals. The Chinese call it *yellow sand;* it is an impalpable powder of that color, and wholly unlike the dust which fell throughout this and the adjoining province of Kiángsú, March 15th, 1846. (See Journal of the Asiatic Society of Bengal, and Chinese Rep., Vol. XVII. page 521). It was observed at sea, at Hángchau, and at Sháng-hái. Whence did it originate? The opiuion of the Chinese on this subject may, I think, be regarded as correct. They assert that it comes from Peking. We know that the sand of Sahara is sometimes elevated by whirlwinds into the upper currents of the air, and deposited in the Atlantic, twelve hundred miles, sometimes directly opposite to the trade winds. Over against the vast alluvial Plain of Eastern Asia is the ocean of sand—the Desert of Gobi or Shamoh, extending from near the sea westerly 2,300 miles, and 3 to 400 broad—including the conterminous sandy districts. Like its counterpart in Africa, it is subject to whirlwinds which raise its fine dust like the waves of the sea, and doubtless at times waft it into the upper currents of air, and transport it to distant regions. I have been informed by intelligent natives of Kiángsí and Honán, that the phenomenon occurs in those provinces also. Assuming the Mongolian steppes to be the source whence these showers descend, the amount of sand which is annually conveyed hither must be prodigious to cover such an extensive area. Regarded

in a meteorological and in a geological point of view, these showers possess no small interest; but if my conjectures respecting the part which they play in the ecouomy of nature be well founded, they are of higher interest to the agriculturists of this most densely populated region. I would premise the suggestion with the remark that the Chinese, who from remote antiquity have been close observers of everything pertaining to agriculture, all agree in asserting that a shower of dust indicates a particularly fruitful season. They, it is true, never refer to the dust as the *cause* of good harvests, but such invariably followi its fall. The humus of this great alluvial tract is extremely compact, and to some extent is probably segregated and loosened by the sand of Gobi being scattered over its fields. Those two great rivers, with several smaller ones which drain the Plain, are ever bearing to the sea the lighter portions of the soil, and so tinging it as by its hue to give name to that part which laves these shores. These remarkable showers then are replenishing and diluting the soil which rains and rivers are ever impoverishing. It is not supposed that all the detritus which is conveyed to the sea is the sand which by these remarkable showers is brought from the sterile wastes of the North, but there can be no doubt that much of the matter of the Yellow Sea is from that source, and also that the sand acts favorably on the soil.

The extraordinary rains of the previous year, the injury to the crops and soil, and consequent famine, lead us to hope that the anticipations of the husbandmen may not be disappointed, whether the theory here propounded be correct or erroneous.

Ningpo, April 26th, 1850.

Note.—It has been ascertained by Ehrenberg that the dust or yellow sand which falls like rain on the Atlantic near the Cape de Verde Isles, and is sometimes transported to Italy, and even the middle of Europe, consists of a multitude of silicious-shelled microscopic animals. "Perhaps," says Humboldt, "many of them float for years in the upper strata of the atmosphere, until they are brought down by vertical currents, or in accompaniment with the superior current of the trade-winds, still susceptible of revivification, and multiplying their species by spontaneous division, in conformity with the particular laws of their organization." Further research may show too that the sand in the Chinese Plain contains animalculæ.—*Ed. Ch. Rep.*

A Twentieth Memoir on the Law of Storms in the Indian and China Seas, being the April Cyclone *of the Bay of Bengal; 23rd to 28th April,* 1850.—*By* Henry Piddington, *President of Marine Courts.*

(Concluded from page 61.)

SUMMARY.

I now state the grounds on which the positions of the centre on the various days and from them the average line of the track has been laid down.

On the 22nd April.—We have no bad weather for the ships fairly within the Bay, but the *Barque Iron Gem* had bad weather in 6° 47′ N.; and 87° 49′ East, in which she lost the main piece of her iron rudder by the blow of a sea. The wind was with her at Noon at N. N. W. veering to W. N. W. by the following day, and she was at 210 miles S. W. b. S. of the *Cowasjee Family*, which ship had only moderate breezes and latterly squally weather from N. b. E. to E. N. E. The *Iron Gem*, then, may have been on the Western edge of a small Cyclone, but, as it bore E. N. E. of her, the *Cowasjee Family* would if she had any part of it have had the centre nearer to her, and consequently as bad or worse weather. I am inclined, then, to think that the *Iron Gem's* gale was for this day an instance of the Westerly equatorial monsoon reaching very far to the North; or of the S. W. monsoon of the Bay setting in.

On the 23rd April.—We have the *Nereid, Eneas, Duke of Wellington* and *Atiet Rohoman* between 15° and 17° North with light and moderate airs between E. N. E. and North, but with no indications of a coming Cyclone, their Barometers also ranging from 30.00 to 29.85. To the Southward, however, *the Cowasjee Family* in 11° 45′; and the *Iron Gem* in 6° 40′ had, being now on the same meridian, the first strong N. E. breezes and dark gloomy weather with squalls moderating at 9 p. m.* and increasing again at midnight, and the second a heavy N. W. to N. N. W. gale varying p. m. to W. N. W. with terrific

* This is apparently the usual instance of an interval of moderate weather which is so frequently experienced at the onset of a Cyclone.

squalls. This would place the *Cowasjee Family* on the N. W. and the *Iron Gem* on the S. West quadrant of a Cyclone at more than 300 miles distant from each other, the *Iron Gem* having drifted to the Eastward, and the *Cowasjee Family* run up to the N. N. West in the preceding 24 hours. But then these winds and consequent bearings of the centre, would place it at upwards of 250 miles from the *Cowasjee Family* to the S. Eastward and at 218 miles from the *Iron Gem* to the N. E. b. E. though she had P. M. the wind veering to W. N. W. with terrific squalls showing that if it was a Cyclone she was close to the centre; and the *Cowasjee's* Barometer at Noon this day was still as high as 29.76. I think then that although we might perhaps in strictness say that we had but indifferent data on this day also to assign any centre for a Cyclone, yet as we find it so closely following up and increasing on the *Cowasjee* at midnight that she had then all preparations for a hurricane made while standing to the N. Westward, I have placed a centre for this day in 80° 42′ North; Long. 90° 28′ East, though this will require a large circle to include both ships.*

On the 24th of April.—We have the *Cowasjee Family, Duke of Wellington* and *Eneas*, nearly on a curved arc, of which the chord lies from W. S. W. to the E. N. Eastward. Of these three ships we find that the *Cowasjee Family* standing up to the N. Westward had the wind veering from N. E. at 4 A. M.; to North at 10 A. M. and Noon. It was also increasing in violence to "a perfect hurricane" at 9 30 A. M., when, the ship lying to very badly, she very properly bore up and scudded to the S. S. W.

The next ship to the *Cowasjee* is the *Wellington*, at 43′ to the N. E. b. N. of her, with a rapidly increasing gale at N. N. E., having had for the preceding twenty-four hours some warnings from the sky, but the Barometer having continued very high being at 30.00 at noon on the 23rd, and at 29.90 only on the 24th. The *Nereid* and *Eneas* the next ships to the E. N. Eastward had still at noon on this day the light baffling winds which so often precede a Cyclone. The *Eneas*

* In former Memoirs (see Second Memoir, Journ. As. Soc. Vol. IX.) I have found that Cyclones perfectly well traced and of moderate dimensions in the middle of the Bay, and on the Coast of Coromandel, appear to commence near the Andamans as large ones.

notices a heavy swell, but the *Nereid* has not remarked on the sea till near midnight.

We have thus the logs and positions of the *Cowasjee* and *Duke of Wellington* only to fix the position of the centre for this day, and from these we should strictly place the centre in 12° 10′ North; and 90° 58′ East; but, owing to the very acute angle formed by the lines of bearing from the wind-points, this is evidently too far to the Eastward, for it places the centre at 180 miles to the East of the *Cowasjee* which ship had a full hurricane, and at only 120 and 85 miles to the S. E. and S. b. E. of the *Nereid* and *Eneas* with which ships the Cyclone had not yet commenced. The *Wellington* also is apparently by the Chart nearer to the centre than the *Cowasjee*, yet her weather is not described as *very* severe till the afternoon, when Capt. Duncan rightly judging his position and the track of the Cyclone bore up to cross in front of it.

We must farther remark that the positions of the *Wellington* and *Cowasjee* are uncertain, and particularly that of the latter vessel which was carrying sail to the Northward and Westward against the N. Easterly gale. They had moreover no observations on this day, and the log can rarely be much attended to in merchantmen when all hands are busy with the preparations for a gale. It is evident also that the centre was much closer upon these two ships since they were involved in the Cyclone circle than to the *Nereid* and *Eneas*, the positions of which we must take to be correct, since they had fine weather and were but a few days from the Sand Heads, and we shall further see that the Cyclone was, here, one of those of no great extent but of excessive severity within a short distance of its centre. With all these views then I have estimated the centre to be for this day about in Lat. 11° 10′ N.; and Long. 89° 20′ East.

25th April.—On this day at 2 A. M. the centre must have passed between the *Eneas* and *Nereid*, and close to the *Eneas*, as while, or after, dismasting her it veered to the S. East. This ship's log being lost we can only estimate her run from noon and position at this time, nor have we the detailed log* of the *Nereid* either, though the summary

* This is always required, however full and carefully drawn up the abstract of the log may be, because until all the documents are collected it is impossible to say at what hour it may be necessary to ascertain any ship's position. I have fre-

is an excellent, and doubtless a careful one. If we had it we should be able, as she had the wind carefully noted at N. N. E. (9), a full gale at 3 A. M, to assign a nearly exact position for the centre at this time. As it is however we shall not perhaps be far wrong in placing it at 2 A. M. in Lat. 12° 10′ N. and Long. 89° 6′ East. For its position at noon of this day, the *Wellington* and *Cowasjee* having run out of the circle, and the *Eneas* (without any reckoning) clearing her wreck, we have that of the *Nereid* with a heavy gale at W. N. W. and the *Atiet Rohoman* with a N. E. b. Northerly gale, rapidly increasing, having had during the forenoon, the uncertain veerings of the wind between N. b. E. and N. East, which indicate her to have been just on the outer circles of the Cyclone and directly in its path. The French ship *La Meuse* had also a commencement of blowing weather from this day and the bearings from these ships will place the centre at noon in Lat. 13° 32′ N.; Long. 88° 45′ East. The track appears to have curved upwards in a more Northerly direction for these last 24 hours, as if the Cyclone was now "bound" for Point Palmyras, instead of Coringa, which it appeared to be from the 23rd and the 24th. We must not omit to notice here that the *Cowasjee Family*, after cleverly running back by the aid of the Western quadrants of the Cyclone to escape its centre, had now bore up again, being at noon about 250 miles to the South of the centre, but without the actual limit of the Cyclone. She however, found the sea so heavy *from the Northward* that she could carry very little sail. And this sea is constantly noticed in the log up to the 27th, in Lat. 13° 45′ North, the ship thus evidently following in the track of the Cyclone, and *ploughing* through its rearward sea for two days!* We find also on this day the first notice of its approach to the Sand Heads in the "heavy leaden sky" of the *Tavoy's* log and the threatening appearances noticed in the *Coleroon's*, both shewing how clear and unmistakeable the atmospheric indications are if properly attended to, for the centre was on this day at $7\frac{1}{2}$ degrees, or 450 miles, distant from the Outer Floating Light.

On the 26th of April.—We have the *John McVicar* homeward

quently had to calculate the same ship's position twice, and sometimes three times in the 24 hours from her log, to compare it with that of others.

* See Col. Reid's Work "*Progress and Development of the Law of Storms*" where these rearward seas are capitally delineated.

bound, meeting the Cyclone coming up from the Southward and in scudding to cross in front of it, not having accurately calculated its track, she ran too near to the centre, and at 11 A. M. broached to with a shift of wind from North to N. W. so that the centre must have been at this time close to the Eastward and by noon to the N. Eastward of her estimated position, which is given in the extract from the log. The *Neerlandsch Indie* also had the calm of the centre by 3 P. M.* the shift being from E. N. E. to W. S. W. which gives a N. N. W. track for the Cyclone, while our projected one is N. 15° West. By Noon on this day it was also reaching *False Point* and the Pilot station† where all the vessels had a N. E. gale commencing, and the *H. C. P. V. Tavoy* which had stood to sea, having had as will be seen in Mr. Ransom's able report, all the signs of an approaching Cyclone in the course of the 25th and morning of the 26th. This vessel was at noon about 40 miles to the South of the Outer Floating Light and had from daylight a gale oscillating from N. East to East; a bank collecting to the S. W.‡ is also noted in Mr. Ransom's table. At noon the *Tavoy* had the singular interval of perfect calm in the middle of the gale, which he refers to the treacherous calm (meaning the treacherous interval of fine weather), which I have so often noted at the onset of a Cyclone, and which has occasioned the dismasting of so many ships by inducing them to make sail, thinking the gale was over though their glasses had not risen; and we may indeed suppose that many have been lost through it, for had Mr. Ransom been a young or over-sanguine commander, or one with great anxiety to make a passage and little accustomed to tropical tempests, we may easily imagine him making sail and his vessel blown over and foundering with the fierce hurricane which followed, before he could take it in again. The *Joseph Manook* 40 miles to the Eastward of the *Tavoy*, did not experience this calm but had the same indications of a Cyclone. It is interesting to trace here, as we fortunately can so accurately do, the state of the weather from the *Tavoy's* position inwards.

* To avoid confusion this ship's position of noon 26th, being close *at* the centre, is not marked on the Chart.

† As usual with them when a Cyclone is approaching, and probably owing to the effect of the land.

‡ Probably the *Atalanta's* and *False Point* Cyclone.

We find then that the Outer Light Vessel 40 miles to the North of her, which vessel has furnished a very careful log which does her Commander Mr. Mendham great credit, had strong N. E. and Easterly winds with squalls and light showers increasing to a heavy gale at E. N. E. at Midnight, when the Bar. had fallen to 29.60.

At 35 miles farther North, namely at the Saugor *Flat Buoy*, we find by Mr. Smart's report the weather, though more moderate, still blowing hard with peculiar gusts, and about noon at times almost calm, and at 8 P. M. a remarkable low scud flying. The heavy slaty appearance of the sky on this and the preceding days is well noticed by Mr. Smart.*

At Calcutta 60 miles to the north of the Saugor *Flat Buoy*, we had nothing but calms with excessively oppressive weather, and Calcutta is at 278 miles from the centre of the Cyclone on this day.

To the N. Eastward we have the H. C. Surveying *Brig Krishna*, at 175 miles distant to the E. N. E. from the centre, with strong breezes from East to S. E. b. E. and S. E. with a heavy southerly swell and dark gloomy appearances to the South and S. S. W. of her. At *Akyab* there is nothing remarkable in the weather.

To the N. N. W. we have it commencing to blow from the Eastward in heavy squalls, at noon, at *False Point*, 138 miles from the centre. The *Rob Roy* at 83 miles to the N. West had by noon strong gales from the N. Eastward and *La Meuse* at the same distance to the W. b. N. had heavy squalls from N. East veering to North, P. M.; but the *Iskunder Shah*, 128 miles to the W. b. N. had nothing more than threatening appearances and the wind only E. N. E. at sunset, and a high Barometer, so that it would seem that, to the Westward, the Cyclone did not extend so far as to the Eastward and round to the North and N. N. W.

* And the word too is a very good one, for the appearance is at times such we may imagine a slate quarry to present, if the edges of the strata were curved instead of straight and angular: that is, the sky is not one leaden, or slaty-coloured, veil or curtain, but a mass of dim slaty-coloured clouds which scarcely seem to be separate, and are laid thickly over each other. I have described these clouds at Calcutta as a dense mass of strati, cumulo-strati and nimbi, but they were not with us so peculiarly dark coloured (being no doubt thinner) as to assume any very remarkable leaden or slate colour.

But there were evidently at this time (noon 26th) *two* Cyclones, for we find that the *Atalanta*, 150 miles to the S. S. W. of the *Neerlandsch Indie*, had at 11 A. M. of this day, "a sudden shift to the Westward" with tremendous fury, carrying away the three topmasts, mainmast head, &c. Now, this ship had been running down to the S. S. W. with the wind gradually increasing and veering from E. N. E. at P. M. of the 25th, till this time, so that it would appear that this may have been at first a part of the original Cyclone wind, but we cannot say when the separation commenced. The *Ardaseer*, 140 miles to the Westward of the *Atalanta*, had but a strong N. W. b. W. breeze with gloomy weather and heavy swells from the Eastward and S. Eastward, and the *Iskunder Shah* at 150 miles to the N. b. W. of her had as already noted, only threatening appearances up to midnight. *La Meuse* also before noted, which ship was only 47 miles East of the *Iskunder Shah*, had evidently part of the original Cyclone, for she had the wind from N. E. to N. N. E.: at noon and P. M. at North veering rapidly to N. N. W. and blowing a hurricane at 7 P. M., and gradually veering to West at 5 A. M. of the 27th when it reached to the meridian of her position at that time. It would then appear that the North West wind of the South Western quadrant of the main Cyclone, and the S. Easterly wind of the N. East quadrant of the *Atalanta's* Cyclone, must have neutralized or overlaid each other, so as to prevent the main Cyclone's extending so far as the position of the *Iskunder Shah*. The vicinity of the Coast also probably affected the Cyclones in some degree, as it always appears to do.

On the 27th April.—Taking first the *Atalanta's* small Cyclone, we find it on this day at about 7 A. M. dismasting in one furious burst the *Iskunder Shah*, and continuing till midnight a severe hurricane, before it began to break; but it was not of any great extent, for by noon on this day it was fine with the *Ardaseer* though only 60 miles South of the position which Capt. Shire assigns to the *Iskunder Shah*.

Returning now to the principal Cyclone, we find that the *Krishna*, *Joseph Manook*, *Tavoy* and *Beacon Light Vessel*, had all on this day from midnight, severe gales from East and E. S. E. to S. E.: S. S. E. and S. S. W. moderating in the afternoon and evening according to their positions, being all more or less from 100 to 110 miles to the North Eastward and E. N. Eastward of False Point.

At False Point itself, though the centre of the main Cyclone undoubtedly passed over that station, yet there were some anomalies, occasioned I have no doubt by the action of the *Atalanta's* Cyclone, which deserve careful notice.

The Cyclone at False Point on the 26th had veered from East to S. E. and South, and at 9 P. M. to the S. West, when it moderated and fell almost a calm with a clear sky, a bright moon and stars shining over-head but a very thick mist surrounding the horizon. At 3 A. M. on the 27th, it began to blow from the N. West "a complete hurricane" till 5 A. M., and at 8 A. M. the wind is again marked S. S. E. and the gale terminates with the wind about South to S. b. W. The time of its becoming a moderate breeze is not marked.

The Easterly wind veering to S. W. would indicate an average N. N. W. course for the Cyclone, but the calm at the S. West wind point, and the subsequent heavy gale at N. W. though of so short a duration, indicates either that the centre now vibrated to the Eastward,* or that the ordinary action at the centre was in some way disturbed by the *Atalanta's* and *Iskunder Shah's* Cyclone just noticed, which may (as the smaller whirlwinds certainly are) have been absorbed into it, and have thus augmented its intensity and velocity.

At Balasore 68 miles to the N. b. E. of False Point we find the Cyclone to have fairly begun (with all the usual and precursor signs on the 26th) at 5 A. M. on the 27th, according to Mr. Bond's careful report; and to have veered in its passage from N. E. to W. b. S. which will give an average track of N. N. W. $\frac{1}{2}$ W. for it at this time, the centre passing up to the East of Balasore, 20 to 40 miles to the W. S. W. of which station the *gale* is stated to have been moderate, and very moderate.

Mr. Bond states that there was a brief lull for about five minutes at Balasore, when the wind *shifted*† Westerly which seems to have been between 6 and 8 A. M., say at 7 or 7.30 A. M.

* Was this the effect of the junction of the *Atalanta's* Cyclone which as we see was travelling up parallel to the principal one and may have for a time produced this remarkable deflection. In my last Memoir, the Jumna's Cyclone, a small one, appears to have vibrated between two large ones.

† *Veered* is used in the report and *shifted* in the letter. It is to be regretted that seamen do not carefully choose at the time between these two words.

The exact point at which the centre passed appears to have been about midway between Balasore and Jellasore, at the Dantoon staging Bungalow,* as described in Mr. Campbell's brief but valuable note, which is a remarkable instance of how important even the briefest common-sense narrative of the passage of these meteors may be to us. Capt. Spens' more detailed and careful account of his observations in a lonely sea-shore Bungalow, without any instruments, is another instance to shew that great light may be often thrown upon questions of which the observer may not perhaps think at the time, for his account, with Mr. Baillie's, and that of Mr. Brackley in October, 1848, Jour. Vol. XVIII. p. 849, aid us much to understand for the future the terrific accounts of the inundations from the great storm Waves, when their elevation, the time of tide, and the intensity of the Cyclone are such that they are raised to their highest point.

The centre at noon 27th must have been about Lat. 21° 45′ N. Long. 87° 20′ E. or a little to the W. N. W. of Jellasore, since it lulled for about half an hour at 10 A. M.; and thus the true centre at $10\frac{1}{4}$ A. M. or in $22\frac{1}{4}$ hours, had travelled up from its position on the 26th to the Dantoon station, a distance of 218 miles or at the rate of 9.8 miles per hour: though it seems latterly to have travelled at a greatly augmented rate, for it was bearing about West of the station of Midnapore at noon, or had travelled according to this estimate, something more than 30 miles in an hour and three quarters. It is possible that this increased velocity may have commenced after the irregularity at False Point, to whatever cause that was owing. We must however, observe here that the wind is stated also to have been due North at noon at Bancoorah also, which station is 60 miles to the N. N. West of Midnapore; the fact being, as I have elsewhere shewn, that the mere surface winds on shore, are but very indifferent guides for the position of the centre. Midnapore has many irregularities of surface, but Bancoorah has much more of these, and we cannot really say in what direction the actual wind was blowing at the different stations. It is only the calm centres which we can trust to for an accurate estimate of the track of the Cyclone.

28*th April.*—We have no farther reports of this Cyclone beyond

* *Anglice*—Traveller's cottage-house, at the stations where the palanquin bearers are changed.

Bancoorah, and we have next to consider whether that described on the 28th in Capt. Sherwill's report from Berhampore, could have been the Midnapore one curving to the N. N. Eastward? Berhampore bearing N. N. E. 120 miles from Midnapore, and the calm centre passing Berhampore by Capt. Sherwill's exact observations at 4 A. M. on the 28th, or about 16 hours after it was abreast of Midnapore, would give a rate of travelling of about 8 miles per hour. I am thus inclined to think, that this *was* the original main Cyclone, which was deflected by the line of the Rajmahal hills, and that the remarkable appearance which I have described at Calcutta, if it was what we might readily suppose it to be, (and I still think it may have been a division of the Cyclone seen by me,) did not give rise to the Moorshedabad Cyclone. There is nothing, however, impossible in the heavy bank to the Eastward having been an independent Cyclone, for we have no reports from Jessore, Dacca, or Krishnagur, in which districts it would have been felt, but if it had been violent we should probably have had some. Moderate gales, no one, I regret to say, thinks it worth while to report.

We have, nevertheless, it will be seen, traced this formidable Cyclone, from undoubted evidence over a track of 1000 miles as in the following table.

Dates. 1850.	Course.	Distance.	Rate per Hour.
23rd to 24th April.	N. 42° W.	192	8.0 Miles.
24th to 25th	N. 13° W.	148	6.2
25th to 26th	N. 15° 30′ W.	287	12.0
26th to 27th	N. 3° 10′ W.	217	9.1
27th to 28th	N. 18° 00′ E.	156	6.5
		1000	41.8
			8.4 Average.

Its average course *at sea* (for we should in fairness reject its land progress) was N. 17° 38′ W. and the entire average rate of its progress for the whole five days was 8.4 miles per hour. The variations in the rate of travelling, exactly correspond with what has been before

shewn in various memoirs, and which I have now no doubt constantly occur.

Remarks on the management of the ships.

The vessels which have suffered in this Cyclone, are numerous enough to make it worth while, for future instruction, to state briefly what their management was, and might have been, or what the peculiarly deceptive or adverse circumstances were which placed all management, so far as to avoiding the Cyclone, out of the question.

1. *Iron Gem.* Disabled by an accident.

2. *Cowasjee Family.* Should have stood out to the Westward so as to raise her Barometer at midnight 23rd—24th, and then, being bound to the Northward, should have hove to till the wind was N. W. when she might have run round the heel of the Cyclone, and up with it; carrying Southerly winds on its Eastern quadrants, which would have saved time and the risks of the severe weather and heavy seas she had; otherwise she was well managed.

3. *Nereid.* Perfectly well managed with a full knowledge of her position; and no doubt escaped the Cyclone by that knowledge and management.

4. *Eneas.* Was crossing in front of the Cyclone, but did not steer sufficiently to the Westward to *raise* her Barometer, which fell 0.3 between noon and midnight. S. W. or even W. S. W. till she obtained a fine-weather Barometer, was her safe course.

5. *Atiet Rohoman.* This ship hove to to allow the Cyclone to pass her. She might by running off to the W. S. W. and S. W. and gradually hauling to her course, have made a fair wind of it; *if* she steered well enough to allow of her doing so.

6. *John McVicar.* The same error as the *Eneas*, in crossing too closely. With abundant sea room the safe plan is always to haul out for a good and rising Barometer before crossing.

7. *Duke of Wellington.* This ship was like the *Nereid*, capitally well managed, and with a thorough knowledge of her position.

8. *H. C. Surveying Brig Krishna.* Knowing her ground perfectly, and with the long experience of her able Commander, there could be no question that this vessel would heave to in the right time and place as she did; but a merchantman would not act prudently in running in quite so close to the Sand Heads before heaving to, to say

nothing of its being perfectly useless to do so, since she would be ordered to sea again.

9. *Neerlandsch Indie.* This ship unfortunately hove to exactly in the track of the Cyclone. She should have run off S. W. or S. W. b. W. at 10 P. M. on the 25th; or at midnight at latest, and have gradually hauled to the Southward on her due course, as the wind and her Barometer would have shewn her that she was rounding and passing the Cyclone.

10. *La Meuse.* Hove to at the proper time, but might have run off a little to the Westward to allow the centre to pass her, hauling round it as the wind came to the Westward of North, so as to make a fair wind of it throughout.

11. *Rob Roy.* Had been standing off from the land but might also have run to the South and round the heel of the Cyclone, by which she would have avoided all the risks she ran with a shifted cargo.

12. *Iskunder Shah.* Deceived by her Barometer (a good Simpiesometer would probably have shewn the danger) and hampered with the land could do no better.

13. *Atalanta.* We have no account of this ship's Barometer till the 26th, when she appears to have run into the parallel Cyclone; theoretically, she was running very fairly to the S. S. W. to avoid the first. This can only be explained by supposing she was close to the spot where the second Cyclone descended, or was developed from the main one.

We have thus—

Ships well, and perfectly well managed,	5
—— Crossing too close in front of the Cyclone,	2
—— Embarrassed by the land or deceived by their Barometers,	3
—— Hove to in the track of the Cyclone,	1
—— Ran dangerously too close in,	1
Total,	12

The most remarkable and important phenomenon of this Cyclone, however, is the undoubted fact of the very limited fall of the Barometer, as compared with the intensity of the storm, which we see successively dismasted, or disabled, or damaged, in its progress of five days,—the *Iron Gem, Eneas, John McVicar, Atalanta, La Meuse, Iskunder Shah, and Neerlandsch Indie,* and has no doubt done other mischief of which we have no account.

This fact of the little fall of the Barometer until the centre was close upon the ships may be connected with the limited extent of the Cyclone itself. I have elsewhere remarked* that for a distance of 100 to 150 miles from the centre, there seems to be no exact rates of fall by which we can estimate the distance of the centre; and in this the Cyclones appear to assimilate to the smaller tornado-Cyclones, tornados and whirlwinds, which, we have reason to believe, do not affect the Barometer to any remarkable extent on their approach. The vigilant seaman and the philosopher will see in this a strong argument for a careful investigation and registration of the various atmospheric signs upon which I have so much insisted, until we can obtain a complete code of these also, and furnish all observant seamen with a BAROMETER OF SIGNS.

On a Series of CALDERITE *Rocks.—By* HENRY PIDDINGTON, *Curator Museum Economic Geology.*

My analysis of Calderite (in Vol. XIX. p. 145, of the Journal) was of course performed from the best and most homogeneous (i. e. approaching to perfectly mixed) specimen which could be obtained. It will nevertheless be remarked in that paper, which describes the specimen analysed as the type of the rock, that, with the magnifier the siliceous mixture which constitutes it a rock is distinctly seen in thin splinters when held against the light. I have been able, from the late Mr. Williams' abundant supply of these so called Iron ores, the whole of which are Calderite, to obtain a very curious and instructive series of specimens, illustrating distinctly the formation of the Calderite by the mixture of the siliceous with the Iron and Manganese mineral, like the large and small grained granites, in the first of which the silex, felspar and mica seem rather to be agglomerated in masses than to form a true compound rock, and in the latter the component parts are only seen by a magnifier. I have therefore selected for our Museum, and for the guidance of geologists and mineralogists a series of fourteen of these specimens. I think it right to give a brief description of each, so as to enable them to recognise the rock in its various appearances.

* Horn Book.

No. 1.—Is a common transparent quartz rock, in which on the one side the Iron and Manganese mineral is seen only in small and minute rounded specks like Melanite garnets, as if a little of it in powder had been melted up with the quartz.* Towards the other side of the specimen it is seen to increase in quantity, forming small nests and short veins; and on the extreme part of it the nests become large, and there are also seen mammillated coatings of the Iron and Manganese upon the quartz. When the mineral is fractured at these nests the Iron and Manganese appears as a brilliant black granular mass.

No. 2.—In this the quartz is no longer massive, but, like the Manganese and Iron, is in coarse grains as if a sort of coarse conglomerate of the minerals had been formed; on one side this specimen passes into No. 7.

No. 3.—The coarse grains of No. 2, are here smaller; the weathered surface resembles a granular brown iron ore.

No. 4.—The granulation is here much finer, and some specimens, if superficially looked at, especially on the weathered surfaces, might pass for a coarse brown and red sandstone. On the fracture it has the appearance of a coarse brownish-white sandstone.

No. 5.—The sandstone appearance assumes in this variety a resinous glance on the transverse fracture; and on the horizontal one it becomes laminar and of a reddish-grey, resinous, appearance. The weathered surface glisters like a coarse-grained Diallage or Schiller spar.

No. 6.—In this specimen the Iron and Manganese appears like a coarse granular black Pitchstone, intermixed with dark brown grains of quartz. The weathered surface is porous and of a dull brick-red colour.

No. 7.—The granular structure of No. 6 is here much closer and finer. The weathered surface is of a dirty reddish-brown colour.

No. 8.—The constituents of the mineral are in this specimen so mixed, that they look like a very fine-grained pitchstone-porphyry.

* It is far more fusible than the quartz, and this accounts for the rounded form of the grains. Yet we should have expected, unless we suppose the quartz to have been an aqueous deposit, that mere igneous fusion would have mixed the materials more completely. Some of the recent discoveries of the solubility of minerals in steam, at merely atmospheric pressures, seem to point to a solution of the singular enigmas which quartz and other rocks so often present when we consider them as produced by mere igneous fusion.

The weathered surface resembles that of some kinds of hornblende rock.

No. 9.—A fine-grained resinous rock; like powdered black rosin agglomerated in a mass.

No. 10.—Is the specimen which I have described as the type of the mineral in my former paper upon it; which for the sake of connexion I copy here.

"This rock can be in no way so well described as by saying, at once, that while on the weathered surfaces it resembles a common massive ore of iron, its appearance on the fresh fracture is exactly that of black rosin. When examined by the magnifier it is seen to have a golden resinous (which is yellow quartz) coating, in thin laminæ, especially on some of the fractures. On others it has small specks which are seen by the magnifier to be minute cavities full of a yellow powder.

"The fracture is difficult to describe, being in some places hackly, in others tending to small conchoidal, and in some instances breaking on a large scale into an obliquely rhomboidal cavity, as if the rock would cleave naturally into oblique rhomboidal prisms, or contained crystals of that shape. The most perfect cavity I could measure, for I could not obtain a good solid angle, was one of 124°, giving therefore 56° for the acute angle of the rhomboidal crystal.

"The splinters are often nearly laminar and sometimes highly translucent, like dark brown rosin. When held to the light these are seen to contain, here and there, fragments of bright white quartz.

"The streak is ash-coloured, and obtained only with the file, or on a salient edge by the knife. It is brittle, and easily fractured with a moderate blow. The powder is fawn-coloured. When breathed upon it gives a metallic odour. The latter portions are tough and difficult to pulverise, requiring repeated sifting and hard pounding.

"Its hardness is 7.8. The specific gravity 3.65.

"The solid mineral does not alter by digestion in acids, and even in nitro-hydrochloric acid; hydrochloric acid dissolves a little iron, but in very small proportion (probably from dust) even from extremely thin pieces."

No. 11.—A lighter coloured variety of No. 10; having on some parts, and in a good light, the appearance of impure yellow rosin.

No. 12.—Has the appearance of a resinous pitchstone: That is to say, it is resinous on some fractures and on others almost a pitchstone in appearance.

No. 13.—This last is almost a black and brown, narrow-banded, Jasper in external appearance, but on the fresh transverse fracture it shews a very distinct granular resinous structure and aspect. The tendency of fracture (or of cleavage) is however distinctly in the planes of the laminæ, and when even a minute splinter is held to a strong light the arrangement of the imbedding of the black mineral in the yellow brown quartz is distinctly seen to be horizontal and parallel like the bands on the larger surfaces.

The mineral geologist will, I trust, from these descriptions, be enabled to identify this curious rock wherever he may meet with it in any of its varieties; and the importance of mineralogy to geology is now-a-days, too well recognised for me to doubt that, to all lovers of scientific accuracy this paper will be acceptable. We are moreover, in India especially, bound when we bring forward any novelty to shew as clearly, and in as full detail as we can, the grounds on which we do so, as we thus advance the cause of science when we are right, or obtain the correction we need if wrong.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

For February, 1851.

A Monthly General Meeting was held in the Society's rooms, Park Street, on Wednesday the 5th instant, at half-past 8 P. M.,

Hon'ble Sir James W. Colvile, Kt., President, in the chair.

The proceedings of the former meeting were read and confirmed.

The following gentlemen were named for ballot at the next meeting:—

Dr. A. Sprenger;—proposed by the President, and seconded by the Secretary.

J. H. B. Colvin, Esq., of the Civil Service;—proposed by the President, and seconded by Mr. Beadon.

Notes were recorded from E. Currie, Esq., W. H. L. Frith, Esq., Lt. Ripley and Captain J. D. Pakenham, intimating their wish to withdraw from the Society.

Letters were read—

1st. From C. M. Montriou, Esq., Superintendent of the Colaba Observatory, forwarding a copy of the first part of the observations made at that Observatory during the year 1847, containing the Magnetic observations.

2nd. From N. Shaw, Esq., Secretary, Royal Geographical Society of London, requesting spare Nos. of the Journal of the Asiatic Society, to complete the set of that work in the possession of the Geographical Society. Ordered that the Nos. be supplied to the Geographical Society.

3rd. From C. Wiedmann, Esq., Librarian of the Royal Academy

of Sciences in Bavaria, forwarding the latest publications of the Academy for the Society's Library.

4th. From Count Freyburg, President of the Royal Bavarian Academy of Sciences, conveying the thanks of the Academy for a copy of Abdul Razak's Dictionary, presented to the Academy by the Society.

5th. From Dr. von Martius, Secretary of the Mathematical and Physical Section of the Royal Bavarian Academy of Sciences, dated 15th February, 1848, requesting a set of the Society's publications.

The delay in the receipt of this letter led to some discussion as to the best mode of facilitating the exchange of publications and the regular receipt of the same, whereupon it was proposed by Mr. J. R. Colvin, that it be referred to the Council to consider the measures which may be necessary, with a view to the regular receipt by learned Societies and individuals in Europe, of the numbers of the Journal and other publications of the Society which are forwarded to them in exchange for transactions and other works forwarded by them. The motion having been seconded by Capt. Hayes was carried *nem. con.*

6th. From Dr. Buist, Bombay, submitting a paper entitled,—"Floods in India, for 1841." Ordered to be printed in the Journal.

7th. From H. Torrens, Esq., Honorary Vice-President, enclosing a note from F. O. Siddons, Esq. of Moorshedabad, on Capt. Latter's Selections from Burmese Literature, and presenting the following books in the name of their Author, Mauluvi Masih-úd-dín Ali Khán Bahádúr, namely, Jadâvaul Talú-e-Gharub, Dariyáe Latáfat, Miftah-ul Reshád.

With reference to Capt. Latter's work, it was proposed by the Hon'ble President, seconded by Mr. J. R. Colvin, and resolved, that the Society do take five copies of Capt. Latter's Burmese Selections, and inform him that they regret the limited object of the Oriental Fund and the state of their own Funds prevent them from offering a larger encouragement to his work.

8th. From Capt. G. Siddons, 1st Cavalry, transmitting the continuation of his translation of the Vichitra Nátak.

9th. From Dr. Roer, communicating extracts from letters, received by him from Mr. F. Dummler, Berlin, Professor Böhtlingk, St.

Petersburgh, and B. Dorn, Esq., Director of the Armenian Museum at St. Petersburgh. Referred to the Council.

10th. From T. B. Mactier, Esq., Offg. Joint Magistrate of Bancoorah, announcing the despatch of a meteoric stone, which fell at Bishnupur on the evening of the 30th November last, and forwarding two depositions given by persons residing near the spot, and the result of his own enquiries on the subject.

Resolved, that the thanks of the Asiatic Society be conveyed to Mr. Mactier for the zeal he has evinced in forwarding the specimen to the Society.

The papers connected with the proposal, by Rev. K. M. Banerjee, for the publication of the Puráṇas were next brought forward, when it was resolved, proposed by J. R. Colvin, Esq., and seconded by Rev. W. Kay, that it be referred to the Council to arrange with the Rev. K. M. Banerjee as to the particular Puráṇa, the publication of which, with a translation, it may be most desirable to undertake in the first instance, having regard to the MS. translations of portions of the Puráṇas in the possession of the Society.

Mr. Piddington, by permission of the President, read a paper from the *Chinese Repertory* entitled, "Remarks on Showers of Sand in the Chinese plain," by Dr. J. MacGowan.

The Librarian and Zoological Curator having read their usual monthly reports the Meeting adjourned.

Confirmed. *March* 5, 1851.

J. Colvile, *President.*

Report of Curator, Zoological Department.

To the Secretary of the Asiatic Society of Bengal.

Sir,—I have only now to report the following donations:

1. From E. C. Bayley, Esq. C. S. an imperfect skin of the Fox of Tibet, described *J. A. S.:* XI, 589, and which I believe to be identical with *Vulpes ferrilatus*, Hodgson, *J. A. S.* XI, 289, and also with *V. nipalensis*, Gray, *Mag. Nat. Hist. n. s.* I, 578, and probably also with *V. Hodgsonii*, Gray, *ibid.* (vide *J. A. S.* XI, 589, note); the species varying somewhat in colour both individually and with regard to season. In this case the name *Vulpes Hodgsonii*, Gray, must be adopted; for *nipalensis* is a misnomer. Its difference from the Himalayan *V. montanus* is much the same as that of the American *V. fulvus* from the European *V. vulgaris;* and the Afghan and Persian *V. flavescens*, Gray, is again very distinct from either.

2. From L. C. Stewart, Esq., H. M. A bottle of reptiles in spirits, collected in various parts of the upper provinces.

3. From Mr. Jas. Montieth. A portion of a log of toon-wood, having a large mass of decomposing granite imbedded in it.

E. Blyth.

February 3rd, 1851.

Library.

The following books have been added to the library since the January meeting.

Presented.

Observations made at the Magnetical and Meteorological Observatory at Bombay for the year 1847.—By C. W. Montriou, Esq. Part I. Magnetical Observations, Bombay, 1850.—By the Bombay Government.

The Ancient Sculptured Monuments of the County of Angus. Edinburgh, 1848, Elephant folio.—By Dr. George Buist.

Anglo-Hindustani Hand-Book, Calcutta, 1850, 12mo.—By E. Colebrooke, Esq.

Lexicon Geographicum, cui titulus est مراصد الاطلاع على اسماء الامكنة و البقاع

E Duobus Codicibus MSS. Arabicis editum. Duo exhibentem Literas Elif-Bá-ta. Ediderunt T. G. J. Juynboll et J. J. B. Gaal.—By the Curators of the Academy of Leyden.

Philosophical Transactions of the Royal Society of London, for the year 1850, part I.—By the Royal Society.

Proceedings of the Royal Society of London, Nos. 73—5.—By the same.

Transactions of the Royal Society of Edinburgh, Vol. XVI. Part IV.—By the Society.

Markestoun Meteorological Observations for 1844.—By the Royal Society of Edinburgh.

Proceedings of the Royal Society of Edinburgh.—By the same.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, 4th Vol. Part II. III, and Vol. V. P. II. III.—By the German Oriental Society.

Susrutas Ayurvedas. Id est Medicinæ Systema a venerabili D'hanvantari demonstratum a Susruta discipulo compositum nunc primum ex Sunskrita in Latinum vertit, Introductionem annotationes et rerum indicem adjecit, Dr. Franciscus Hessler, Tome II. 1847, 8vo.—Royal Academy of Bavaria.

Gelehrte Anziegen, Nos. 24, 25, 28, 29.—By the same.

Bulletin der Koniglichen Akademie der Wissenschaften for 1847, (Nos. 1 and 7 wanting).—By the same.

Ueber den Antheil der Pharmacie an der Entwicklung der Chemie. Festrede zur Borfeier des Geburtstages seiner Majestat Maximilian II. Konig von Bayern gehalten in der offendlichen Sitzung der K. Adakemie der Wissenschaften am 27th November, 1849, von Dr. L. A. Buchner, Munchen, 1849, 4to. pamphlet.—By the same.

Uber den Entwicklungsgang des Griechischen und Romischen und des Gegenwärtigen Zustands des Deutschen Lebens. Von Ernst von Lasaulx. Munchen, 1847, 4to. pamphlet.—By the same.

Die Staatliche Entwicklung bei den Völkern der alten und neuen Zeit. von Georg Martin Thomas. Muuchen 1849, 4to pamphlet.—By the same.

Almanach der koniglicheu bayerischen Akademie der Wissenschaften fur das Jahr, 1849.—By the same.

Rudimenta Mythologiae Semitica et supplementa lexici Aramaici scripsit Paulus Boetticher. Berolni, 1848, Pamphlet.—By the same.

Journal of the Royal Geographical Society of London, Vol. XX. Pt. I.—By the Society.

Bulletin de la Société de Geographie. Troisième Serie, Tome XIII.—By the Society.

Quarterly Journal of the Geological Society, No. 23.—By the Society.

Journal Asiatique, Nos. 73-4.—By the Socie'te' Asiatique de Paris.

Report of the Calcutta Public Library, for 1850.—By the Curators of the Public Library.

Journal of the Indian Archipelago, Vol. IV. No. 12. Two Copies.—By the Government of Bengal.

Oriental Baptist, No. 70.—By the Editor.

Upadeshaka, No. 50.—By the Editor.

The Zenana Opened: or a Brahmin advocating Female Education (in Bengali).—By Ba'bu Ra'jendrala'l Mittra.

Calcutta Christian Observer, for February, 1851.—By the Editor.

Oriental Christian Spectator, for December, 1850.—By the Editor.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of Nov. 1850.—By the Deputy Surveyor General.

Miftáh ul Reshád. By Mohammad Masih-ud-dín Khán Báhádur. Persian, 8vo.—By Ra'ja' Ra'mchand Sing.

Ditto Ditto by the Author, through H. Torrens, Esq.

Dariá e Latáfat.—By the Same.

Jadával Talu-e-Gharúb by Mauluvi Mohammad Masih-ud-dín Khán Báhádur.—By the same.

Purchased.

Journal des Savants, for Oct. 1850.

Comptes Rendus, Nos. 17 @ 21.

Travels of Evilyá Effendi, Vol. II. Translated from the Turkish by Ritter Joseph von Hammer-Purgstall, Vol. II.

Date.	Observations made at Sun-rise.						Observations made at apparent noon.						Maximum Pressure observed at 9h. 50m.					
	Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Temperature. Of Air.	Temperature. W. Bulb.	Wind.	Aspect of Sky.
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°		
1	30.036	63.4	63.3	61.3	N. N.W.	Cirro-strati	30.135	69.2	70.8	65.3	N. W.	Clear	30.112	72.6	73.0	65.2	N.W.sp.	Cloudy
2S	.047	59.4	59.3	57.9	N. E.	Clear	.112	67.0	69.2	63.6	S. W.	Ditto	.072	72.4	74.0	64.8	W.S.W	Cumuli
3	.100	61.2	61.5	60.3	N. N. E.	Ditto	.139	68 6	71.2	66.3	W.S.W.	Ditto	.067	75.0	76.5	66.9	W.	Ditto
4	.019	63.0	62.6	61.3	E. N. E	Cirro-strati	.056	69.6	72.0	67.8	E. S. E.	Cirro-strati	29.987	75 0	76.5	67.6	S. W.	Cirro-strati
5	.017	62.3	62.5	60.5	E. N. E.	Clear	.051	71.3	74.4	66.2	S. E.	Clear	30.001	76.6	79.0	65.0	S. S. W.	Clear
6	.030	63.5	63.6	61.7	S. E.	Ditto	.084	70.8	73.6	67.0	E. N. E.	Ditto	.019	77.3	80.1	69.0	S. S. W.	Cumuli
7	.006	67.4	66.9	66.4	E. N. E.	Foggy	.041	71.4	75.0	62.0	S. E.	Cumulo-strati	29.973	79.0	81.4	73.4	S. S. W.	Cumulo-strati
8	.012	67.3	66.8	64 9	N. W.	Scattered-clouds	.047	70.1	70.9	67.0	W.N.W.	Clear	.973	75.3	76.4	69.2	N. E.	Cumuli
9S	.000	68.0	67.4	66.2	S. S. E.	Rain & thundg.	.042	71.6	74.0	67.8	S. W.	Cirro-cumuli	.990	76.5	78 5	68.7	N. W.	Cirro-cumuli
10	29.922	68.3	68.0	66.2	S. S. W.	Cirro-strati	29.980	72.6	74.4	70 2	S. S. W.	Cirro-strati	.934	78.0	80.0	71.2	S.	Cirro-strati
11	.849	67.6	67.3	66.1	S. S. E.	Cirro-cumuli	.896	73.5	75.0	72.0	S. S. W.	Cloudy	.835	76.7	77.7	73.5	S. S. W.	Cumulo-strati
12	.796	65 5	65.0	64.5	N. N. E.	Clear	.880	68.2	69.8	67.4	N. N. E.	Clear	.841	74.0	75.3	69.0	N.	Cirro-cumuli
13	.959	66.3	66.4	65.2	S. E.	Cirro-cumuli	30.039	72.3	75.0	68.8	E. S. E.	Cirro-cumuli	.989	77.4	79.3	68.0	E. S. E.	Ditto
14	.902	71.3	71.5	70.7	S.	Ditto	29.939	76.2	78.4	74.2	S.	Cloudy	.916	78.2	79.8	74.3	S. W.	Cloudy
15	.886	69.0	68.2	67.0	N. N. E.	Overcast	.959	69.3	69.7	67.8	N. E.	Ditto	.917	74.4	76.3	70.6	N. E.	Cirro-cumuli
16S	.929	67.7	68.0	66.8	N.N.W.	Scattered-clouds	30.000	71.7	73.0	65.7	N.	Cirro-cumuli	.993	75.0	76.3	66.8	N.	Ditto
17	.982	66.4	66.3	64.6	N.	Cirro-cumuli	.066	70.9	72.2	61.0	N.	Clear	30.024	75 5	76.6	63 2	N.	Clear
18	.999	63.7	62.6	58.4	N. N. E.	Clear	.062	70.3	72.3	62.9	N. E.	Ditto	.015	75.3	77.0	65.3	N. E.	Ditto
19	.927	68.5	68.3	66.7	E.	Scattered-clouds	29.983	73.0	75.0	69.7	S. S. E.	Cloudy	29.936	76.5	78 8	72.3	N. W.	Cumulo-strati
20	.960	63.6	63.6	61.4	N.	Clear	30.032	72.5	75.2	61.4	N. E.	Clear	30.002	77.0	78.6	62.5	N. W.	Clear
21	30.040	64.4	64.9	62.8	N. W.	Ditto	.101	72.6	75.2	67.3	W.N.W.	Ditto	.067	78.0	79.5	63.6	W.N.W.	Ditto
22	29.997	64.0	62.3	58.0	N. W.	Ditto	.033	69.2	71.6	62.6	N. W.	Ditto	29.968	76 4	78.0	61.2	N. W.	Ditto
23S	.892	62.8	62.7	60.3	S. E.	Ditto	29.944	70.5	73.0	64.6	E. N. E.	Ditto	.888	76.9	79.4	67.5	S. E.	Cumulo-strati
24	.924	66.2	65.8	63.0	E. N. E.	Ditto	.999	73.7	76.7	69.4	E. N. E.	Ditto	.958	79.3	81.5	67.6	E.	Ditto
25	.939	66.5	67.0	65.0	W.S.W.	Ditto	.998	74.2	77.0	69.6	N. E.	Ditto	.956	80.2	82.3	67.6	S. W.	Cumuli
26	.873	70.0	70.3	68.4	S. S. W.	Ditto	.925	77.4	80.2	70.9	S.	Ditto	.892	83.0	84.6	75.2	S.	Ditto
27	.840	71.3	71.0	69.6	S. W.	Ditto	.911	75.5	77.8	71.6	S. W.	Ditto	.864	81.2	83.3	68.2	W.S.W.	Clear
28	.850	73.8	74.0	72.8	S.	Cloudy	.925	78.3	80.4	75.3	S. W.	Cumulo-strati	30.000	83.3	85.3	75.4	S. S. W.	Cumuli
Mean	29.955	66.2	66.0	64.2	....	.....	30.014	72.9	74.8	67.3	....	.....	29.971	77.0	78.8	68.3	....	.....

[*Meteorological Register, continued.*]

Observations made at 2hs. 40m.						Minimum Pressure observed at 4 p. m.						Observations made at sun-set.						Maximum and Minimum Thermometer.				Rain Gauges.			
Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind.	Aspect of Sky.	Max.	Mean.	Min.	Max. Therm. in sun's rays.	Feet. Upper. 4.	Feet. Lower. 4.	Moon's Phases	Date.
Inches	°	°	°			Inches	°	°	°			Inches	°	°	°			°	°	°	°	Inch.	Inch.		
30.019	72.2	73.8	65.2	N. E.	Cirro-strati	30.020	73.3	72.8	64.6	N.	Cirro-strati	30.044	71.6	70.4	63.3	N.	Cirro-strati	74.4	69.2	64.0	89.6	..	..	●	1
.006	76.8	77.3	65.0	W.S.W.	Cumuli	.008	76.9	76 3	65,0	S. W.	Clear	.027	74.3	72.8	65.2	W S W	Clear	78.0	68.8	59.6	94.6	..	..		2
29.986	78 5	78.9	66.9	W.	Ditto	29.989	78.8	78.3	66.6	W.	Ditto	.012	76.4	74.8	67.5	W S W	Ditto	80.0	70.8	61 5	97.0	..	..		3
.931	79 0	79.4	66.0	N. W.	Cirro-strati	.931	79.0	78.6	64,5	W.N.W.	Ditto	29.965	76.6	75.0	66.0	N. W.	Ditto	80,4	71.7	63.0	94.2	..	..		4
.936	80.0	81.6	67 0	S. W.	Clear	.941	80.4	80.0	66.0	W.N.W.	Ditto	.972	77.6	75.9	67.4	W.	Ditto	82,0	72.5	63.0	99.8	..	..		5
.944	81.5	82.5	70.9	S. W.	Cumuli	.937	82.0	82.2	70.3	S. W.	Cumuli	.946	80.0	79.0	70.3	S. E.	Cumuli	83.7	73.9	64.0	102,2	..	..		6
.304	83.7	84.4	72.3	S.	Ditto	.884	83.6	83.0	70,8	S.	Ditto	.909	80.3	79.0	70.6	S S W	Cy. to the N.W.	84.9	76.0	67.0	103.7	..	..		7
.913	79.0	80.7	72 4	N N E	Ditto	.925	78.4	78.0	70.5	N.	Scatd.-clouds	.935	75.0	74.0	68,6	N N E	Scatd.-clouds	81.4	74,3	67.2	97.6	0.09	0.11		8
.915	81.0	81.7	69.9	S. W.	Ditto	.895	81.5	81.0	68.2	WS W	Cumuli	.907	79.0	77.9	69.0	WS W	Cirro-strati	82,5	75.3	68.0	101.7	..	..	☽	9
.927	81.5	82.0	72.3	S. W.	Cumulo-strati	.816	80.1	78.4	71.3	S S W	Cumulo-strati	.831	77.7	76.3	68.8	S.	Scatd.-clouds	83.1	75.8	68.4	99.6	0,05	0.08		10
.691	80.8	81.3	74.4	S. S. W.	Ditto	.754	71.4	67.6	65.8	N N E	Cloudy	.756	68.8	66.7	65.2	E S E	Cirro-cumuli	82,0	74.5	67.0	99.8	1.94	2.06		11
.772	78.2	79.2	71.2	S. N. E.	Cirro-cumuli	.785	79.1	78.9	70.2	N.	Clear	.816	76 6	75.6	69.8	NNW	Clear	80.0	72.7	65.3	98.9	..	..		12
.918	80.8	82.2	69.6	S. E.	Ditto	.901	82.2	82,2	69,6	S. E.	Cirro-cumuli	.898	80.0	79.2	70.6	S. E.	Ditto	82.5	74.5	66.4	107.0	..	..		13
.873	76.3	76.4	72.7	N. N. E.	Cloudy	.851	77.5	76.9	72,4	E.S.E.	Ditto	.850	75.6	74.4	71.3	E.S.E.	Scatd.-clouds	80.7	75.8	70.9	98.4	0.13	0.16		14
.856	75.7	77.0	70.4	N.	Cirro-cumuli	.857	77.4	76.8	69,8	E.	Cumulo-strati	.858	76.3	75.3	69,5	E.S.E	Cumulo-strati	78.2	73.4	68.6	101.3	..	..		15
.934	78.4	78.6	67.6	E. N. E.	Ditto	.922	78.6	78 0	67.7	N. E.	Cirro-cumuli	.924	76.8	75.6	68.7	E.N.E	Scatd.-clouds	79.4	73.4	67.4	99.5	..	..	⊙	16
.957	79.0	79.5	65.4	N.	Clear	.944	79.4	78.5	64,2	E N E	Clear	.959	76.6	74.8	65.3	E.S.E.	Clear	80 0	73.2	66.4	100 3	..	..		17
.919	79.0	79.3	67.3	E.S.E.	Ditto	.904	79.4	79.0	67.2	E.S.E.	Ditto	.909	77.5	76.0	68.3	S.	Ditto	80.0	71.5	63.0	101 3	..	..		18
.849	80.4	81 6	72 3	W.S.W.	Cumulo-strati	.831	82.0	81.9	71.3	N. W.	Cumulo-strati	.848	79 3	78.0	70,4	W.	Ditto	82.5	75 5	68.4	96.8	..	..		19
.938	80 2	81.5	64.6	N. W.	Clear	.927	81.2	81.2	64.4	N. W.	Clear	.937	79.0	77.3	65.3	WSW	Ditto	82.0	73.0	64 0	100 0	..	..		20
.982	81.4	82.3	65.5	W.N.W.	Ditto	.969	82.0	82.3	64.2	W.N.W.	Ditto	.972	79.3	77 2	66.4	N. W.	Ditto	82,6	73.8	65.0	100.4	..	..		21
.864	79.4	80.0	62.8	W.N.W.	Ditto	.844	79.8	79.7	62,8	N. W.	Ditto	.842	77.0	74.8	64.5	N. W.	Ditto	80.6	71.6	62.5	95.0	..	..		22
.804	80.2	81.3	68 6	W.N.W.	Cumulo-strati	.800	81.2	81.4	68,4	WSW	Cumuli	.821	79.0	77.4	67.6	WSW	Ditto	82.6	72.8	63.0	104 5	..	..	☾	23
.869	82.6	83.4	68.0	S. E.	Ditto	.864	83.2	82.6	67.4	N N E	Cumulo-strati	.876	80 8	79.6	68.3	S. E.	Cumuli	84.3	75.4	66.4	105.6	..	..		24
.879	83.6	74.5	68 0	W.S.W.	Cumuli	.872	84.2	84.5	68,8	WSW	Clear	.883	82.2	80.5	68.8	S. W.	Clear	85.0	76.2	67.3	103.0	..	..		25
.811	85 3	85.2	75.6	S.	Ditto	.800	84.7	84.4	74,0	S.	Ditto	.812	81.7	80.3	73.4	S.	Ditto	86.5	78.5	70.5	100.6	..	..		26
.781	85.5	86 8	67.7	W.	Clear	.776	86 5	86.8	66.7	WS W	Ditto	.772	83 4	81.4	69.5	S. E.	Ditto	87.0	79.3	71.5	106.0	..	..		27
.808	87.6	88.4	73.0	S. W.	Cumuli	.798	88.4	88.9	70.3	S. W.	Cumuli	.806	86.0	84.6	75 3	S.S.W	Ditto	88.6	81.3	74.0	107.4	..	..		28
29.889	80.3	80.7	69.0	....	.....	29.884	80.4	80.0	68.0	....	.....	29.896	78.0	76.6	68.4	....	.....	82.0	74.1	66.2	100.2	2,21	2,41		

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